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STAFF APPRAISAL REPORT

KOREA

THIRD AGRICULTURAL CREDIT PROJECT

March 19, 1981

Projects Department, Agriculture II
East Asia and Pacific Regional Office

CURRENCY EQUIVALENTS

Currency Unit: Won

US$1.00	=	W 650
US$1 million	=	W 650 million
Won 1	=	US$0.0015
Won 1 million	=	US$1,538
Won 1 billion	=	US$1.54 million

MEASURES

1 hectare (ha) = 3,000 pyongs
1 pyong = 3.3 sq m

ABBREVIATIONS

ADC	=	Agricultural Development Corporation
AFDC	=	Agriculture and Fishery Development Corporation
GOK	=	Government of Korea
KC	=	Kun Cooperatives
LAOs	=	Loan Appraisal Officers
MAF	=	Ministry of Agriculture and Fisheries
NACF	=	National Agricultural Cooperative Federation
ORD	=	Office of Rural Development
PC	=	Primary Cooperatives
SC	=	Special Cooperatives
TU	=	Technical Unit

FISCAL YEAR

January 1 - December 31

KOREA

THIRD AGRICULTURAL CREDIT PROJECT

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THIRD AGRICULTURAL CREDIT PROJECT

1. BACKGROUND

A. Introduction

1.01 The Government of the Republic of Korea (GOK) has requested Bank assistance in financing a third agricultural credit project through the National Agricultural Cooperatives Federation (NACF). The project would cost US$114.2 million. The Bank would contribute US$50 million, disbursed over four and half years; this would cover 100% of the foreign exchange costs. It would enable NACF to continue the lending activities initiated under the previous two projects, and to expand the project's scope to include lending for the establishment of small-scale agro-processing and chilled storage facilities, and improvement of the marketing of fruits and vegetables.

1.02 The project was prepared by NACF. This report reflects the findings of an appraisal mission that visited Korea in June-July 1980, consisting of Messrs. F.I.H. Moreithi, A. Hasan, R.G. Deshpande, J. Macgregor (Bank), and B.C. Bilbo and R.W. Jessup (consultants).

B. Agricultural Sector

General

1.03 During 1970-79, Korean agriculture grew, in real terms, at an average annual rate of 4.2% compared to 9.9% for the economy as a whole. The more rapid growth of the other sectors has meant a steady decline in the relative importance of agriculture. Between 1970 and 1979, agriculture's contribution to GNP fell from 30.4% to 20%, to total exports from about 12.0% to 9.9%, and to employment from 50% to 35%. In absolute terms, agricultural labor force fell from a peak of 5.6 million in 1976 to 4.9 million in 1979. Nonetheless, agriculture continues to play a vital role in the Korean economy particularly in terms of food supply, rural incomes and employment, and foreign exchange earnings. Agricultural exports, including fish products, rose sharply from US$111.3 million in 1970 to US$1,493.4 million in 1979.

1.04 Korean agriculture is founded on owner-operated smallholdings, numbering about 2.2 million (Annex 1, Table 1). The average holding has remained small, at about 1.0 ha per household. Two thirds of the holdings are less than 1.0 ha. The land reform enacted in the late 1940s set a ceiling of 3 ha per holding of rice land; this has helped to keep the number of landless farmers low, at about 4% of farm households.

1.05 Only 22% of the total land area of 9.9 million ha is cultivable, while about 67% comprises forest land too infertile or mountainous for cultivation (Annex 1, Table 1). There is therefore little scope for expanding the cultivated area. Rice is the major crop and takes about 56% of the cultivated land. The balance, mostly unirrigated upland fields, is used for various crops such as barley, wheat, rye, millet, tobacco, mulberry, ginseng, fruits and vegetables. An increasing area of otherwise uncultivated hillside land is being put under pasture for integrated dairy and beef cattle. Nearly 86% of the paddy land is irrigated but due to adverse climate, only one crop of rice is possible. A rice-barley rotation is widely practiced, while a rice-vegetable rotation is becoming common in many areas as growing of vegetables in greenhouses spreads. Land utilization intensity is about 131% of the cultivable area.

1.06 Rice production has been rising sharply from 3.9 million tons in 1970 to 5.6 million tons in 1979. This sharp rise has been due to the remarkable increase in rice yield which rose from an average of 3.3 tons/ha to 4.5 tons/ha between 1970 and 1979. The increase in yields has in turn been the result of a number of factors, notably: the increased planting of HYV, improvement and expansion of irrigation coupled with land consolidation, and intensive application of crop production and protection inputs. The national price support and subsidy policies (para. 1.14) have also played a major role in stimulating increased production of rice. On the other hand, despite similar measures, barley production has been fluctuating without a discernible long-term trend partly because of the unfavourable consumer preference but also because of relatively low returns to producers; planted area fell by 35% but yields increased by 46% between 1970 and 1979. The Government plans to keep barley production high to utilize land during the winter season and to provide cheap food for the poor.

1.07 The Korean conditions are not well suited to the production of the other grains such as wheat and maize. The available wheat varieties take a long time to mature, thus conflicting with the time for planting rice; the trend in relative producer prices has also been moving in favor of rice compared to wheat cultivation. The area planted to wheat has therefore been declining sharply. Wheat production fell from 219,000 tons in 1970 to 42,000 in 1979. The production of feedgrains, mostly maize, has remained negligible; the country relies heavily on imports (para. 1.10).

Sector Issues, Policies and Strategies

1.08 The agricultural sector has been undergoing structural changes characterized by trends towards: demand for the staple foodgrains rising more rapidly than domestic production; shifting consumption patterns in favor of high-value crops and livestock products; growing labor shortages during the peak season; renewed gap between rural and urban incomes; mounting deficits in the operations of the national price support schemes, particularly for foodgrains; and higher domestic production costs

for the major crops and livestock compared to international costs. These trends also underlie the main issues bearing on Korean agricultural policies, priorities and programs.

1.09 The basic national policy aims at increasing self-sufficiency in staple food crops and improving the welfare of the various segments of society, especially the rural communities. To this end, the Government has pursued a strategy of maximum self-sufficiency particularly in rice and barley, and also in several other crops and livestock. This strategy is translated into operational programs through measures aimed at improving research and extension; promoting the use of HYV, fertilizers and agro-chemicals; promoting investments in irrigation and land consolidation; providing credit; improving marketing and storage; and maintaining high farmgate prices coupled with subsidized farm inputs.

1.10 Self-sufficiency in rice /1 was achieved in 1975 and 1977, but the level of self-sufficiency fell to 86% during 1979 and 503,000 tons of rice had to be imported; partly because of unfavorable weather, imports for 1980 are expected to be considerably higher. Between 1970 and 1979, wheat imports remained relatively stable fluctuating between 1.6 and 1.9 million tons; on the other hand, feedgrain imports rose sharply from 532,000 tons to 2.9 million tons reflecting the rapid expansion of livestock development during the period. The overall level of self-sufficiency (ratio of domestic production of all grains to consumption) fell from 80% in 1970 to 62% in 1979. This trend is expected to continue.

1.11 Rising incomes have stimulated a marked and continuing shift in consumer demand away from the staple grains towards high-value commodities such as meat, dairy products, fish, fruits and vegetables. The Government has therefore had to institute measures to support farmer efforts to increase the production of the high-value commodities. These measures have included credit for investments in sprinkler irrigation, greenhouses, and storage of fruits and vegetables, and strengthening of research and extension services. The proposed project would support these measures by providing credit to increase the production of fruits and vegetables.

1.12 The migration of rural population to urban areas and the more rapid growth of the nonagricultural sectors has continued to reduce the agricultural labor force, thus creating shortages in the supply of farm labor especially during the peak seasons. To lessen this problem, the Government has been supporting selective mechanization of farming activities, particularly the peak season tasks such as land preparation, transplanting and harvesting. The proposed project would modestly help to ease farm labor shortages among the fruit farmers by providing credit for motorized sprayers for orchards.

/1 Barley production is usually above the human consumption requirements.

1.13 The balance between rural and urban incomes depends primarily on the relative productivity of and the terms of trade between agriculture and the other sectors. Partly as a result of limited land resources and the rising average age of farm operators, labor productivity in agriculture has lagged behind the other sectors to the effect that whereas 35% of the labor force is in agriculture, it produces only about 20% of GNP. In view of virtual absence of new cultivable lands and limited scope for multiple cropping, national efforts to increase the productivity of rural labor have focused on improving crop yields, expanding the production of high-value crops and livestock, facilitating a steady rise in the average size of farm holding, promoting selective mechanization, and creating off-farm employment opportunities in the rural areas. The proposed project would improve the productivity of the agricultural labor and terms of trade through: expanding the production of high-value crops notably fruits and vegetables; creating off-season employment from the growing of vegetables under greenhouses; and assisting the construction of storage facilities thus enabling the farmers to take advantage of the higher off-season prices.

1.14 Compared to 1965-70, the trend of the agricultural terms of trade improved appreciably until the mid-1970s but have recently tended to worsen./1 The improvement was partly the result of the agricultural price support schemes. Introduced in late 1960s, these schemes cover mostly rice and barley, and are partly aimed at improving the agricultural terms of trade and effecting transfer of income in favor of the rural areas. Under the schemes, involving 23% and 37% of respectively rice and barley consumption in 1979, the Government procures farm produce at a price above and releases it at a price below the market price (the ratio of release to procurement prices was 75.5% for rice and 44.8% for barley in 1978). For this reason and also the fact that the total volume handled under the schemes has been rising steadily, the schemes have been operating at mounting deficits. During the past decade, the annual deficit increased 75-fold reaching

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/1 On the basis of indices of receipts and payments by the farmers for all items, the trends in agricultural terms of trade are as follow (1975=100):

Average for Period	Receipts (a)	Payments (b)	a/b
1965-70	30.6	36.7	0.834
1971-75	68.9	69.7	0.989
1976-79	166.6	169.7	0.982

Source: Based on Bank of Korea's Economic Statistics Year Bok; 1980.

US$430 million in 1979 (at the then current exchange rate), bringing the cumulative total deficit to US$1,507 million. Under the next Five-Year Plan (1982-86) now being formulated, the Government intends to restructure the agriculture income support program. A Bank Structural Adjustment Loan mission is currently discussing with GOK a phased plan for eliminating the fertilizer subsidy and reducing the Grain Management Fund deficits.

C. Project Main Subsectors

1.15 Fruits occupy about 3.1% and vegetables 11.6% of the cropped land. During 1979, they accounted respectively for 3.5% and 22.1% of the value of agricultural production. As a result of rising incomes, the food consumption pattern has been markedly shifting from the traditional staples in favor of the high value commodities, notably fruits, vegetables, fish and livestock products. Thus, the annual per capita consumption of fruits and vegetables rose from 83 kg in 1970 to 240 kg in 1979, while during the same period the per capita consumption of rice fell from 136 kg to 135 kg./1 Partly as a result of the sharp rise in demand, the prices of fruits and vegetables have been rising more steeply than those of the other major crops./2 The total consumption for fruits rose from about 422,000 tons in 1970 to 856,000 tons in 1979, while for vegetables it rose from 2.2 million tons to 8.2 million tons. The trend is expected to continue (Table 5.1).

1.16 The national policy is to increase the production of fruits and vegetables to meet the rising demand. The main strategy to this end aims at expanding the area devoted to orchards and vegetables, increasing yields through irrigation in upland areas, promoting techniques that enable the growing of vegetables during the winter season, and providing storage for off-season supply of both fruits and vegetables. Furthermore, the growing shortage of farm labor has necessitated introduction of labor saving machinery and equipment such as speed sprayers for orchards.

1.17 During the period 1970-79, production of fruits more than doubled from 423,000 tons to 856,000 tons; production of vegetables more than trebled from 2.5 million tons to 8.6 million tons./3 Apples account for

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/1 Per capita consumption of barley declined from 38.9 kg in 1965 to 18.1 kg in 1978.

/2 During the period 1976-79 compared to 1975, the average wholesale price of fruits rose by 206% and of vegetables by 175% compared to 169% for staple grains.

/3 The consumption and production figures are different partly because of market losses and imports and exports; the 1979 figures are provisional.

about half of the total fruit production. Apart from the unavailability of new land for expansion, the production of both fruits and vegetables is constrained by several factors. Fruits suffer periods of moisture stress during the hot summer months because most of the orchards are located on sandy soils with low moisture retention capacity, or on hillsides, or on excessively drained volcanic ash soils. Few of them are irrigated. Fruit trees therefore suffer from slow growth, and produce smaller fruits and poor quality crops. In the case of apples, moisture stress causes high incidence of skin cracks and poor coloring which result in lower prices to the producers.

1.18 Other constraints include lack of storage facilities, high labor costs, and pests and diseases. Lack of storage facilities compels the farmers to sell their produce immediately after harvesting when the prices are lower than during the off-season. As labor costs rise, many of the farmers are turning to motorized (speed) sprayers; a further factor behind this trend is the health hazards to which people are exposed when using other types of sprayers. The proposed project would help to lessen these constraints by providing credit for sprinkler irrigation systems, on-farm and chilled storage, and speed sprayers.

1.19 Most of the field-grown vegetables are grown under rainfed conditions. They, too, suffer periodic drought and reduced yields. During the winter season, there is ample land for growing vegetables in greenhouses, and this mode of producing vegetables has expanded rapidly during the last decade. However, about 70% of the existing greenhouses are of bamboo or wooden frame which are susceptible to damage from snowfall and strong winds. Their low roof limits plant growth while the numerous internal support structures reduce the planted area and restrict efficiency of cultivating operations, thus resulting in low yields. Lack of storage facilities also depresses the prices that the farmers receive for vegetables such as onions and garlic. The proposed project would accordingly provide credit for the construction of metal greenhouses, and sprinkler irrigation systems for vegetables. The on-farm and chilled storage financed by the project would also be used for vegetables such as onions and garlic.

1.20 The demand for credit to expand the production of fruits and vegetables is expected to remain strong as a result of population growth and increase in per capita income. Many of the farmers now using wooden and bamboo greenhouses are keen to replace them with metal ones, while those with no greenhouses have come to appreciate the benefits from growing vegetables during the off-season.

D. The Financial Institutions and Agricultural Credit

Financial Institutions

1.21 General. The major issues of Korea's financial sector were reviewed by a Bank mission that visited the country in November 1979. The principal financial institutions are the Bank of Korea (BOK), Deposit Money Banks (DMB) and Non-Bank Financial Institutions (NBFI). The Bank of Korea performs the usual central banking functions. Government exercises close

control over most of these institutions, especially with regard to the allocation of funds and determination of interest rates. Most of the DMB /1 and the large NBFI are directly or indirectly owned and controlled by the Government. In addition to obtaining funds from the Government, these institutions rely heavily on subsidized rediscounting facilities made available by BOK. The Government, through the Monetary Board, also periodically fixes interest rates on deposits and loans for all financial institutions.

1.22 Deposit Money Banks (DMB) include commercial banks and the specialized banks. In 1979, commercial banks accounted for about 39% of the assets of the financial sector. While they are authorized to make various kinds of loans, they have traditionally concentrated on short-term lending (about 90% of their loan portfolio). Deposits represent the major portion of their funds and accounted for about 51% of their aggregate resources (liabilities and equity) in 1979. The specialized banks /2 aggregate assets accounted for about 23% of total assets of the financial sector in 1979. For these banks, deposits also play a significant role, accounting for about 58% of total resources. However, Government funds constitute a substantial part of their term lending, accounting for about 50% of the outstanding loans at the end of 1979.

1.23 Non-Bank Financial Intermediaries (NBFI) comprise the development finance institutions,/3 life insurance companies, mutual saving institutions and investment companies. They accounted for about 26% of total assets of the financial sector in 1979. The Korea Development Bank (KDB) is the largest of NBFI, accounting for about 50% of total NBFI's assets.

Agricultural Credit

1.24 Institutional and Non-Institutional Credit. According to a survey carried out by MAF, the average total borrowings of the farm household in 1979 were about W 173.1 thousand (US$266.3). In the early 1960s, non-institutional credit accounted for about 80% of rural credit but, by 1979, it had fallen to 50%. Interest rates for non-institutional credit

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/1 Including the five main commercial banks, all the six specialized banks, Korea Development Bank, and Export-Import Bank.

/2 Korea Exchange Bank (KEB), Citizens National Bank (CNB), Small and Medium Industry Bank (SMIB), Korea Housing Bank (KHB); and also the National Agricultural Cooperative Federation (NACF) and National Federation of Fisheries Cooperatives (NFFC), in so far as their credit and banking activities are concerned.

/3 Korea Development Bank (KDB), Korea Development Finance Company (KDFC), Korea Export - Import Bank, and Korea Land Development Corporation formerly the Land Bank.

ranging from 30-50% p.a. compare with 26% /1 for an unsubsidized market rate of interest. Much of the increase in institutional credit is attributable to the establishment of NACF (para. 1.26).

1.25 The fact that the rural borrowers in general and farmers in particular are willing and able to borrow heavily from non-institutional sources, and at such high interest rates, reflects in part the high demand for credit relative to the supply of loanable funds, even at the current market rate of interest. It also means that as long as the expected return from the various investments (Table 6.1) is higher than the interest charged, many farmers would be willing and able to borrow.

1.26 Main Lending Agencies and Agricultural Credit System. NACF and its member cooperatives are the principal source of institutional agricultural credit. They accounted for about 94% of the total institutional agricultural credit during 1979. The remaining 6% came mostly from the other DMB (excluding NACF). NACF in particular has established a credit delivery and recovery system that now covers over 90% of the farmers in the country. The system has been sufficiently responsive to the varying credit needs in keeping with structural changes of the agricultural sector. Nonetheless, there is need to improve the system particularly by simplifying lending terms and conditions and increasing the degree of flexibility so as to be able to respond more effectively to the increasing sophistication of the agricultural sector.

Interest Rate and Inflation

1.27 During 1979, wholesale and consumer prices rose by over 18% compared to 12-14% during 1978. For 1980, it is estimated that wholesale prices will increase by about 45% and GNP deflator by about 30%. The Government projects these increases at 20-25% and 19% respectively in 1981. Over the Fifth Five Year Plan period (1982-86) the respective average annual increases are projected at 9% and 11%, but actual increases may be higher. At the beginning of 1980 GOK raised the interest rate payable for agriculture subprojects, including those envisaged under the proposed projects, from 12.0% to 18.5% (subsequently reduced to 17.5%) thus bringing it closer to a positive real interest rate. Given the projected decline in the rate of inflation, the interest rate structure stipulated under the proposed project (para. 4.14) would result in a real rate of interest which is positive over the long-run.

E. Extension Services and Research

1.28 The Office of Rural Development (ORD) of MAF is the principal agency responsible for agricultural extension and research. The other important agency is the Agricultural Development Corporation (ADC) which carries out most of the research relating to irrigation and land improvement. The main thrust of both extension and research in Korea has

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/1 During July 1980.

been directed towards foodgrains, particularly rice, barley and wheat. Considerable achievements have been made as is attested by the fact that Korean rice yields are among the highest in the world. Much research has also been done on mechanization, especially on small farm machinery.

1.29 The overall ratio of extension workers to farmers is about 1:500. Foodgrains have taken most of the attention of both the extension and research agencies, and have left little to spare for the needs of the other crops. With the increasing emphasis now being placed on diversified farming, there is a clear need to strengthen extension and research for the other crops especially fruits, vegetables, and livestock, with a view to enhancing the farmers' capacity to cope not only with a wider range of crops but also more sophisticated production technology involving the use of advanced agricultural systems such as greenhouses and sprinkler irrigation for fruits and vegetables. Furthermore, while the existing extension services are essentially adequate for the proposed project, a more effective liaison is needed between NACF, ORD and ADA (para. 4.05).

F. Bank Group Lending for Agriculture

Overview

1.30 The Bank's lending for the agricultural sector, including rural development, has financed 16 projects totalling US$540.5 million as follows:

(a) $188 million for irrigation works, land reclamation, consolidation and improvement projects (Loan 600-KO, Loan 795-KO, Credit 283-KO and Credit 1364-KO);

(b) $22 million for two dairy development projects (Credit 234-KO and Loan 1193-KO) to establish small and medium size dairy farms, dairy processing plants and provision of technical assistance;

(c) $30.5 for two agricultural credit projects (Credit 335-KO and Loan 1328-KO) for lending to farmers to develop orchards, sericulture, on-farm storage, irrigation, greenhouses, poultry and pigs;

(d) $7 million for a seeds project (Loan 942-KO) for the development, multiplication and distribution to farmers, of higher yielding varieties of cereal crops, potatoes and oil seeds;

(e) $65 million for two area development projects (Loans 1319-KO and 1503-KO) involving the construction of earthfill dams, main and secondary canals, pumping stations, land development, village access roads and drainage and irrigation improvements;

(f) $73 million for two agro-processing projects (Loans 994-KO and 1851-KO) for lending to processors for expansion and modernization of agro-processing facilities and to farmers (Loan 994-KO only) for on-farm production of export-oriented crops; and

(g) $155 million for two rural infrastructure projects (Loan 1216-KO/ 1218T-KO and 1530-KO) involving the construction of minor irrigation facilities, roads, bridges, water supply, electric and telephone system, development of fuel wood blocks, and upland reclamation.

1.31 These projects formed part of high priority Government development programs to:

(a) expand and improve the productivity of agriculture, principally rice and other foodgrains; diversify production in favor of higher value crops; increase the supply and quality of processed agricultural products to meet the rapidly rising consumer demand; increase exports from the agriculture sector; and raise farmers' income; and

(b) expand and improve rural infrastructure and amenities so as to raise the quality of life and standard of living in the rural areas.

The First Agricultural Credit Project (Credit 335-KO)

1.32 The first credit project provided funds to NACF for extending medium- and long-term loan to the farmers for development of orchards, sericulture, poultry and swine; and for construction of NACF's training facilities, and consultants (para. 2.30-2.31). Of the total project cost estimated at US$18.2 million, IDA financed 58% ($10.5 million), the Government 23%, and participating farmers the remaining 19%. The principal beneficiaries were to be growers with typical farm sizes ranging from one to three hectares.

1.33 The project became effective in May 1973 and was completed satisfactorily in May 1976, about a month ahead of schedule. As a result of rising costs, and substantially larger amount for individual subloans, the project made loans to about 6,000 farmers instead of 12,000 as expected at appraisal. A substantial change also occurred in the composition of project investments compared to appraisal estimates, primarily due to changing product prices, technological and institutional factors and government policy. The project helped to establish a technical unit (TU) in NACF (para. 4.02) and brought in a total of 59 Kun Cooperatives (KC) to participate in project's lending. TU trained 123 Loan Appraisal Officers (LAO) for Kun Cooperatives.

1.34 A PPAR was issued in November 1978./1 The PPAR concluded that the project fulfilled its primary goals as it succeeded in promoting rapid diffusion of technology, diversification of agricultural activities, and

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/1 OED Report No. 2263.

institutional improvement in NACF. The rates of return were satisfactory with FRR ranging from 29% to over 100% and ERR ranging from 20% to over 100%. Loan repayment, too, was satisfactory (para. 1.39). The main problems identified were: inclusion of subprojects which were unsuitable because of technical problems; inadequate attention by TU staff to proper subloan appraisal methods and procedures during start-up; and slow progress in selection of suitable consultants and in implementation of consultants' recommendations (paras. 2.30-2.31). The first problem was resolved through reallocation of funds; the second through greater attention given to this aspect during supervision, and training of some TU staff at EDI. NACF experienced difficulties in determining the expertise for the consultants financed under the project; furthermore, the implementation of the consultants' recommendation was hampered by several factors, especially NACF's inability to understand the full import of the recommendations.

1.35 Overall, the OED report identified three important lessons: "First, project preparation must be carried out together with the implementing agency, and agreement on all major issues needs to be established. Second, the negotiation process should give the Borrower enough time to analyze all important issues. And third, if the Bank requests that a foreign advisor or consultant be hired, the responsibility would seem to rest with the Bank to explain in detail the specific experience and knowledge that is required and to help the Borrower in selecting candidates for such positions - the responsibility for the final selection remaining with the Borrower." The first lesseon has been taken into full account in the preparation of subsequent projects; the Borrower was primarily responsible for preparing the proposed project. It is intended to allow sufficient time during the negotiation to enable the Borrower to analyze all important issues. The third lesson has no relevance to the second and the proposed project.

The Second Agricultural Credit Project

1.36 This project was a continuation and expansion of the program financed under the first project. The project envisaged loans to about 7,900 farms for apple orchards, silkworm rearing houses, sprinkler irrigation for orchards, greenhouses for vegetable production, and on-farm storage for fruits. Total project costs were estimated at US$41.2 million, of which the Bank financed $20.0 million (49%), Government $8.8 million (21%) and subborrowers $12.4 million (30%).

1.37 The project became effective in March 1977 and funds were fully disbursed by the end of March 1980, about three months ahead of schedule. Project lending for on-farm investments totalled W 20.0 billion involving 7,642 subloans (97% of appraisal estimate). Lending for greenhouses and on-farm storage exceeded the appraisal estimate by 135% and 30%, respectively, but this was offset by a corresponding decline in other subprojects,

mainly as a result of unforeseen price and demand changes. The project funds were accordingly reallocated. The number of participating KCs rose by 241 to total of 347.

1.38 The project has contributed significantly to increased production of fruits and vegetables. Furthermore, the increased number of participating cooperatives and the expanded training of LAOs have enhanced their capability to appraise and implement agro-investment projects. Project implementation proceeded without any major problem, thus reflecting the improved capability of NACF and the Kun Cooperatives to handle such projects.

1.39 The loan repayment rate for both the first and the second projects have been satisfactory; at the end of 1979, the arrears were 1.3% of the outstanding loans; of this, only 28% was overdue for more than six months.

2. NATIONAL AGRICULTURAL COOPERATIVE FEDERATION (NACF) AND MEMBER COOPERATIVES

A. Guiding Principles and Operation Scope

Corporate Goals

2.01 As a general corporate policy and in keeping with the basic cooperative principles, NACF and its member cooperatives place greater emphasis on rendering services to their clients than on maximizing profits. Thus, they undertake several non-income earning activities such as extension services, staff training, and administration of government programs at cost. They, however, aim at globally covering the cost of their various activities by internally generated revenues, or subsidies in the case of the government-directed programs. In general, they rely on the banking operations to offset any losses in the other operations.

Operation Scope

2.02 NACF and its member cooperatives carry out a wide range of activities: extension of agricultural credit; mobilization of funds through their banking activities; distribution of agricultural inputs and farm machinery; provision of processing and marketing facilities and services; and insurance coverage for their members. They therefore play a vital role in the implementation of the national agricultural policies and programs. Their significance is reflected by the fact that they now account for 94% of institutional credit to agriculture; 12.6% of the total outstanding loans, and 14.9% of the total deposits under Korea's entire banking system; and handle 21% of the total marketed agricultural commodities, 75% of farm chemicals, machinery and equipment, and 100% of fertilizers.

B. Organizational Structure

Overall

2.03 NACF was created in 1961 as the apex body of, until the beginning of this year, a three-tier cooperative structure, with Kun (county-level) Cooperatives in the middle and Primary (village-level) Cooperatives at the base (see Chart 1 and Chart 2). The structure also includes Special Cooperatives, organized on a commodity basis, mostly for horticulture and livestock. Following the recommendation of a Committee set up by the Government during the second project, Kun Cooperatives become branches of NACF with effect from January 1981; as NACF branches, they concentrate on banking and lending operations, leaving the other activities to the Primary Cooperatives. There are now 1,490 Primary Cooperatives (PC), and 142 Special Cooperatives (SC). The PC have a membership of 2 million, thus covering over 90% of the farm households, while the SC have 58,000 member farmers.

2.04 The activities of the member cooperatives are directed by a Board of Directors elected annually by the member farmers; an executive director is responsible for the day-to-day operations. The number of staff varies from one cooperative to another according to the volume of business. The staff of most of the PC and all the SC include general extension staff for technical advisory services to the member farmers. As a whole, the cooperatives have a total staff of about 41,000.

National Agricultural Cooperative Federation (NACF)

2.05 Organization and Staffing. NACF is wholly autonomous in its day-to-day operations and management. It is, however, subject to general policy directives by the Ministry of Agriculture and Fisheries (MAF). Its operational policies and procedures are formulated by a Steering Committee consisting of the NACF President (appointed by the President of Korea); representatives of MAF, Ministry of Finance, and Bank of Korea (BOK); and five cooperative delegates appointed by the General Assembly of the Cooperatives. The president is assisted by two senior vice-presidents and six vice-presidents. In general, its organizational structure is along functional lines (see Chart 2).

2.06 NACF has a total of 149 branches spread throughout the country and a staff numbering about 4,000. Many of the staff, about 40%, have university education. The staff turnover is low, about 7% in 1979. Staff training and development, for all cooperative staff, are conducted at its Central Training Institute and five provincial training centers. The facilities are adequate while the quality and level of training are consistent with the present and future needs of NACF and its member cooperatives.

C. Main Functions

Member Cooperatives

2.07 Primary Cooperatives (PC). The key role of the PC is to maintain the day-to-day contact with the general farmers, while SC do the same for horticultural and livestock farmers. Their main functions include extension of short-term credits, mobilization of rural savings through mutual credit schemes, distribution of farm inputs and consumer goods, assembling and marketing members' produce, and providing general technical advisory services. Thus, the PC own and run such facilities as marketing centres and chain stores in small towns, warehouses and grain mills. Most PC also operate a mutual credit scheme aimed at mobilizing savings in the rural areas. By the end of 1979, PC had mobilized mutual credit deposits amounting to W 590 billion (US$ 1.02 billion), and accounted for about 40% of the total cooperatives' deposits.

2.08 Special Cooperatives (SC). The SC do not engage in deposit mobilization. Their main functions are: specialized technical advisory services, supply of farm inputs, and marketing of members' produce. They own and operate processing facilities, mostly for dairy products.

National Agricultural Cooperative Federation (NACF)

2.09 General. NACF plays the central role in guiding, coordinating and supervising cooperative activities. It serves as the apex bank, accepting surplus deposits from member cooperatives, and the channel for injecting governmental and other external funds into the cooperative system, down to the farmers. It plays a special role in the training of all the cooperative staff (para. 2.06). Generally, the member cooperatives pass on to NACF those functions that are more efficiently done in a centralized manner, thereby attaining greater operating efficiency. Accordingly, NACF undertakes, at the national level: banking and lending operations; procurement and distribution of farm inputs, machinery and equipment as well as consumer goods; marketing of agricultural produce; and insurance schemes.

2.10 Banking and Lending Operations: At the end of 1979, the amount of deposits directly generated by NACF amounted to about 6% of the total cooperatives' deposits. The large part of its deposits consist of deposits by PC and KC. Of the total loans disbursed by cooperatives during 1979, NACF direct lending accounted for about 19.1%, while KC and PC respectively accounted for 34.0% and 46.9% (see Table 2.4). The main role of NACF in the lending operations has hitherto been to inject external funds into the cooperative system; but now that KC have become branches of NACF, its role in lending directly to the farmers and generating deposits will increase substantially.

2.11 Farm Inputs, Machinery and Equipment: NACF is directly responsible for centralized procurement of these items, and for arranging their delivery to the various member cooperatives. As a multi-purpose organization, NACF extends similar services for essential consumer goods. During 1979, the goods handled by NACF under these activities amounted to W 1,018 billion (US$ 1.7 billion).

2.12 Produce Marketing: NACF also provides marketing services to its members. To this end, it operates collection centers and warehouses throughout the country. It also owns and runs wholesale markets in the major cities. During 1979, farm produce marketed through cooperatives reached W 599 billion (US$ 1.2 billion), having risen from W 300 billion in 1975. As a whole cooperatives now account for about 21% of the farm produce sold in the country; according to the major commodities, they account for 14% of the foodgrains, 40% of fruits and vegetables, and 20% of livestock products.

2.13 Insurance. NACF also provides damage and life insurance coverage. The life insurance business was boosted up by the transfer of over 1 million policies worth W 92 billion from the Ministry of Communication to NACF in 1977. Effective life insurance policies amounted to W 406 billion, in 1979, compared to W 150 billion in 1975; the premium received totaled W 39.8 billion. Damage insurances include livestock, fire, forest-fire, and depositors' welfare coverages. Total damage insurance during 1979 amounted to W 1,395 billion, with the premium amounting to W 2.4 billion.

D. Lending Operations

Resources Mobilization and Utilization

2.14 Deposits: The total resources of the cooperatives as a whole amounted to W 2,805 billion (US$4.8 billion) in 1979, after growing at about 37% p.a. during 1975-79. A noteworthy feature of the cooperatives' resources mobilization is the increase in the share of deposits with a corresponding decline of dependence on Government funds. Deposits have been the most rapidly growing source of funds as their contribution rose from 43% of total resources in 1975 to 52% in 1979. Nearly 43.7% of the deposits during 1979 were generated from the urban areas. Table 2.1 summarizes the resources position at the end of 1975 and 1979.

Table 2.1: COOPERATIVES RESOURCES POSITION

	1975		1979	
	W billion	%	W billion	%
Banking Business				
Deposits	350	43.5	1,464	52.2
Government/BOK loans	286	35.6	662	23.6
Other	4	0.5	67	2.4
Nonbanking Business				
Insurance	40	5.0	164	5.8
Other	79	9.9	295	10.5
Equity	44	5.5	153	5.5
Total	803	100.0	2,805	100.0

Source: Mission estimates. Accurate consolidated data for total cooperative system are not available. Figures here include resources of NACF and Kun cooperatives, and mutual credit and equity of Primary cooperatives.

2.15 Overall, there has been an improvement in the availability of term resources in that the share of the time and saving deposits increased from about 50% in 1975 to 67% in 1979; on the other hand, this trend means rising cost of deposit funds. Most of the deposits are used for credit in the rural areas, mainly short-term loans. But while the aggregate amount of loans from deposits has been rising,/1 the proportion going to agriculture has remained low at about 30%. This is mainly due to the lower interest rate generally payable for agricultural loans compared to the cost of the deposit funds. To encourage the use of deposits for agricultural credit, the Government extends subsidies/2 to NACF to cover the difference between the lending rate of interest and the cost of deposits; it also provides NACF with low-cost funds to blend with deposits thus reducing the average cost of funds.

2.16 Borrowed Funds: All cooperative borrowings are routed through NACF. Borrowings totalled W 662 billion at the end of 1979, with about 95% originating from the Government (including government guaranteed foreign

/1 The proportion of deposits used for loans increased from 48% in 1975 to 52% in 1979.

/2 Subsidies relate to subloan mostly made before 1980; the subsidies would therefore taper off as these subloans are amortized.

loans) and BOK. These funds are made available to NACF and the cooperatives for firmly specified purposes, notably: procurement of fertilizers and other farm inputs, agricultural machinery and equipment, export financing, livestock development, and rural housing.

Composition and Maturity Structure

2.17 Table 2.2 shows the subsectoral and maturity structure of the total cooperatives' outstanding loans in 1975 and 1979. The amount increased from W 308 billion in 1975 to W 1,141 billion in 1979. But the share of agriculture remained more or less the same at about 59%. Most of the non-agricultural lending goes to finance rural development activities including rural housing. With regard to maturity, medium- and long-term loans for agriculture, as a proportion of total outstanding loans, fell from 45% in 1975 to about 33% in 1979. There was no change for the non-agricultural lending as the proportion remained at 41%.

Table 2.2: LOAN PORTFOLIO /a
(outstanding as at December 31)

	1975		1979	
	W billion	%	W billion	%
Agricultural				
Short-term	44	14	297	26
Medium- and long-term	139	45	374	33
Subtotal	183	59	671	59
Nonagricultural				
Short-term	120	39	278	24
Medium- and long-term	6	2	192	17
Subtotal	126	41	470	41
Total	308	100	1,141	100

/a Excluding loans outstanding to Primary Cooperatives for operation and facilities amounting to W 18 billion (1975) and W 52 billion (1979).

Conditions and Terms of Lending

2.18 Security Requirements. All loans above W 1 billion require real estate in addition to chattel mortgage. Land valuation is done by cooperatives and does not take into acount the value added by the proposed

investment. Borrowers with insufficient collateral may avail themselves of the credit guarantee coverage under the NACF Credit Guarantee Fund./1

2.19 Interest Rates. Interest rates are set by the Government and are generally below the present rate of inflation (para. 1.27). They also vary widely primarily according to the purpose and source of funds but also, to some extent, type of borrower (Annex 2, Table 4). At present, they range from 3% for forestry loan to 26% for short-term credit financed from PC's mutual savings and loan deposits. Generally, due to the high cost of deposit funds (at an average of 17.0%), interest rates are higher if financed from deposits. Most of the medium- and long-term loans currently carry 16.5% interest rate, but for certain types of agricultural mechanization the rate may be as high as 22%. Table 2.3 below summarizes the current interest rate structure.

Loan Approval Powers

2.20 Loan approval powers for term credit are sufficiently delegated. NACF county branches may approve loans not exceeding W 5 million, and provincial branches not exceeding W 30 million. Loans exceeding W 30 million are approved by NACF's head office.

Loan Collection Performance

2.21 Overall arrears declined from 7.4% in 1975 to 3.6% in 1979 (Annex 2, Table 3). Most of the arrears relate to the short-term loans, particularly mutual credit loans which accounted for about 75% of the arrears at the end of 1979. However, the arrears on mutual credit loans have also improved significantly from 33.4% (of mutual credit loans outstanding) in 1975 to 9.8% in 1979. Arrears on loans' other than mutual credit, were only 1.1% of such loans outstanding.

E. NACF Financial Conditions and Performance

Financial Conditions

2.22 Total Resources: Table 2.4 presents a summary of NACF Balance Sheet for the last three years (see details, Annex 2, Table 4). Total resources rose from W 1,186.3 billion (US$ 2.0 billion) in 1977 to W 2,067.7 billion (US$ 3.6 billion) in 1979. With exception of equity which more than doubled during the period, other accounts remained relatively stable.

/1 Established by the Government in 1972, and operated by NACF on an agency basis, the Fund is financed from a fee of 0.5% p.a. payable by the borrower, and 0.3% on outstanding loans payable by the Cooperatives. The maximum guarantee units range from W 10 billion (for farmers and fishermen) to W 100 million for special purpose cooperatives.

Table 2.3 CURRENT RATES OF INTEREST
(%)

	Sources of funds			
	Cooperatives			
	Mutual credit deposits	Other deposits	Government and blended funds /a	Bank of Korea
Type of Loan				
Agriculture loans				
Short-term	26.0	24.5	15.0	15.0
Medium and long-term				
Mechanization			18-22.0/b	
On-farm investments			16.5	
Livestock			16.5	
Forestry			3.0	
Irrigation /c			5.0	
Agricultural processing		24.5	16.5	
Agricultural export		21.0		10-12.0/d
Others				
Commercial activities /e	26.0	24.5		
Rural housing			13.0/f	

/a Cooperative and Government funds blended to reduce cost of funds to agricultural borrowers.

/b Specific rates are determined by the Government.

/c Including land development and small-scale private irrigations.

/d Export bills are discounted at 12% with BOK and a line of credit made available at 10%.

/e Short-term.

/f Funds from NACF, KHB and provincial governments.

Table 2.4: NACF BALANCE SHEET SUMMARY (AT YEAR END)

	1977		1978		1979	
	W billion	%	W billion	%	W billion	%
Assets						
Liquid	362.3	30.6	635.0	37.7	665.2	32.2
Loans & receivables	514.1	43.3	710.6	42.2	955.5	48.1
Others /a	309.9	26.1	339.7	20.1	407.0	19.7
Total Assets	1,186.3	100.0	1,685.3	100.0	2,067.7	100.0
Liabilities & Equity						
Deposits	555.9	46.9	840.3	49.9	1,022.6	49.5
Borrowings /b	422.9	35.6	530.1	31.4	662.1	32.0
Others /c	186.0	15.7	282.0	16.7	325.2	15.7
Total Liabilities	1,164.8	98.2	1,652.4	98.0	2,009.9	97.2
Equity	21.5	1.8	32.9	2.0	57.8	2.8
Total Liabilities & Equity	1,186.3	100.0	1,685.3	100.0	2,067.7	100.0
Debt-equity ratios /d	19.7:1		16.1:1		11.6:1	

/a Mainly general business inventories.

/b In 1979, 44% were short-term, and 46% long-term borrowings; W 243 billion (37%) Government funds; W 319 billion (48%) BOK funds; W 58 billion (9%) foreign funds; and W 12 billion (6%) other borrowings.

/c Mainly insurance reserves and payables.

/d Borrowings/equity. Deposits have been excluded since they are covered by legal reserves and in view of the steady flow of new deposits; other liabilities have also been excluded because they consist mainly of funded insurance reserves.

2.23 Liabilities and Equity: Deposits continued to be the single largest source of NACF funds, with their share increasing slightly from 46.9% in 1977 to 49.5% in 1979; about 93% comprise deposits from KC and PC. Borrowings are the next largest source of funds and accounted for 32.0% of total resources in 1979. Borrowings consist mostly of Government and BOK loans (85% in 1979), made available to NACF for specific purposes. For

example, during 1979, about 75% (W 240 billion) of the BOK loans was for financing of fertilizers operations, 17% (W 54 billion) for financing mechanization, and the remaining 8% for export credit.

2.24 Although NACF equity increased substantially between 1977 and 1979, it remains small in relation to total debt. The debt-equity ratio continues to be high, but it improved from 19.7 in 1977 to 11.6 in 1979 (Table 2.4). The high debt-equity ratio need not be a cause of serious concern since most of the borrowings are governmental funds for government-directed programs. In this respect, NACF serves essentially as the arm of the government for implementing these programs.

Financial Performance

2.25 NACF Incomes. Table 2.5 summarizes NACF income statement for the last three years (see Annex 2, Table 8 for details). The net income in 1979 was 1.2% of average total assets, and was a notable improvement from 0.34% in 1977. This improvement was mainly due to an increase in the profitability of the banking operations (from 0.47% of total average assets in 1977 to 0.88% in 1979), and a reduction in the losses from the other operations (from 1.2% of gross sales in 1977 to 0.2% in 1979). These other operations are mostly related to the Government-sponsored programs, and the revenues therefrom are strictly controlled by the Government in the interest of keeping the costs to the farmers low. The commissions received by NACF are accordingly low and generally inadequate to bear their share of the overheads.

Table 2.5: SUMMARY OF NACF INCOME STATEMENTS (1977-79)
(W billion)

	1977	1978	1979
General business	(6.6)	(3.8)	(1.9)
Banking business	4.2	7.4	14.5
Insurance business	5.9	6.2	9.9
Total net income	3.5	9.8	22.5
% of average assets	0.34	0.68	1.20

Audit

2.26 NACF accounts are audited by its auditors appointed by the General Assembly, and independent auditors as required by the Bank under the previous projects. In addition, BOK annually inspects NACF credit and banking operations, while the Government's Board of Inspection and Audit particularly audits the use of government funds.

Accounts and Management Information System

2.27 The accounting system of NACF and its member cooperatives is designed to generate separate accounts for the general business, banking business, and insurance business. However, the system does not facilitate accurate allocation of interest and other overhead costs among the various activities. With a view to rectifying this, the first Bank-supported project financed a study by a consultant (completed in 1975) which recommended, inter alia: identification of the costs of the service department, and charging these costs to all the user departments; coding of accounts to facilitate the maintenance of separate accounts by the various departments and consolidating the whole NACF and member cooperative accounting and reporting system.

2.28 These recommendations were accepted by NACF but their implementation was delayed by the failure to provide NACF with sufficient implementation guidelines, and the fact that the proposed codification of accounts envisaged the use of a sophisticated computer system. Moreover, the study was conducted with insufficient involvement of the NACF staff to the effect that NACF staff had little appreciation of the import of these recommendations. NACF has now made the necessary arrangements towards consolidating the cooperative accounts for implementation during 1981. But the codification of accounts and the introduction of cost centers and a cost sharing system is expected to take longer to implement in view of the diversity of the cooperative operations and high costs of computerizing the system.

2.29 With the exception of lending activities, NACF's reporting system is generally satisfactory. In the case of the non-Bank supported agricultural lending activities, the general information system does not generate sufficiently detailed data on such important aspects as the purpose of loans, disbursements, amounts due, collections and maturity structure; neither is information readily available on the consolidated lending by the three levels of cooperatives. NACF is fully aware of these deficiencies and is expected to review the matter and effect the necessary improvements (para. 4.21).

3. THE PROJECT

A. Objectives and Scope

3.01 The project is expected to address some of the important problems now facing Korean agriculture (para. 1.08). In particular, it would increase the production of the high-value commodities in keeping with the changing food consumption patterns. It would also contribute to some increase in the level of farm productivity and create off-season employment, thus helping to improve the balance between rural and urban incomes.

3.02 Over a period of four years, the project would continue to provide credit, on a fully flexible basis, for the type of activities started during the previous projects, namely: greenhouse, sprinkler irrigation, and on-farm storage. It would also finance new activities such as chilled storage, motorized spraying equipment, small-scale agro-processing, backyard beef fattening, and improved marketing of fruits and vegetables. The project activities would cover the whole country. Its design and scope are geared to the present and future capability of NACF in general, and KC in particular. The subprojects have been selected on the basis of the present and projected requirements for investments in the concerned subsector (paras. 1.15 to 1.20). But the actual mix of the subprojects would depend on future demand for credit in these and other subsectors and may therefore differ from the projections. Accordingly, the subproject mix assumed herein is intended largely to illustrate the probable range of the aggregate financial and economic rates of return, and not to circumscribe NACF with regard to actual allocation for each of the subprojects.

C. Project Components

Greenhouses

3.03 The project would establish new metal greenhouses and replace existing bamboo or wooden ones with metal greenhouses. The major items to be financed would be metal frames, polythylene film covers, heat insulating covers, small irrigation pumps and fittings, oil heaters, power sprayers, and working capital for the first crop of vegetables. The average size of the subprojects would be 300 pyeong (0.1 ha) while the investment cost, including the working capital for the first year, would be W 5.82 million. for new and W 3.37 million for replacement greenhouses.

Sprinkler Irrigation

3.04 This would consist of sprinkler irrigation facilities for orchards, mostly apples, and vegetables in the upland areas. The main investment items would be concrete-lined wells, pumping station consisting of kerosene engine or electric motor, centrifugal pumps, pump and engine bases, sprinkler systems, and installation costs. The average cost per subproject would be W 3.32 million for orchards and W 2.01 million for vegetables.

On-farm Storage

3.05 This would consist of construction of storage principally for apples, but also for oranges. The average floor area per subproject would be about 20 pyeong (66 sq m) and the average cost would be about W 5.52 million. The project would finance building materials, construction costs, and fixtures.

Chilled Storage

3.06 This is intended mainly for apples and onions; other commodities would include garlic, oranges, potatoes, and chestnuts. The majority of the subprojects would have a floor area of 100 pyeong (330 sq m). The average investment cost would be W 77.91 million. The major investment items would be building materials, construction costs, refrigeration equipment and related fittings and fixtures, and installation costs.

Speed Sprayers

3.07 The project would also finance speed sprayers for orchards. The cost is estimated at W 7.95 million per unit. Each unit would have a tank capacity of 500 litres, spraying power of 27 psi, and would spray 0.75-1.0 ha/hr. Each would be used by a group of farmers.

Other Components

3.08 These would include sorting and grading machines for fruits; fabrication of packing material for fruits and vegetables, small-scale facilities for processing fruits (oranges) and dairy products, poultry and small-scale piggery enterprises, and backyard cattle fattening, involving two to three head of cattle per household, in cases where sufficient local feed-stuff, such as roughage and crop residues, is available to ensure low-cost production.

C. Cost Estimates

3.09 Detailed cost estimates are in Annex 3, and summarized in Table 3.1. The total project cost is estimated at W 74,219 million (US$114.2 million) of which W 32,526 million (US$50.0 million) or 43.8% is foreign exchange. Costs are based on July 1, 1980 prices. No allowance has been made for contingencies as it is expected that any cost increase would lead to an adjustment in the number of subprojects.

Table 3.1: SUMMARY OF COST ESTIMATE

Subprojects	Local	Foreign exchange	Total	Local	Foreign exchange	Total	Foreign exchange
	M Won			M US$			%
Greenhouses	11,194	11,329	22,523	17.2	17.4	34.6	50.3
Sprinkler Irrigation							
Vegetables	2,937	2,855	5,792	4.5	4.4	8.9	49.3
Orchards	15,710	4,729	10,439	8.8	7.3	16.1	45.3
On-farm storage	12,084	6,006	18,090	18.6	9.2	27.8	33.2
Chilled storage	6,510	4,144	10,564	10.0	6.4	16.4	38.9
Speed sprayers	1,096	1,764	2,860	1.7	2.7	4.4	61.7
Others/a	2,162	1,699	3,861	3.3	2.6	5.9	44.0
Total /b	41,693	32,526	74,219	64.2	50.0	114.2	43.8

/a Includes small scale agro-processing facilities, packaging material, fruit sorting equipment, and backyard livestock development.

/b Because of rounding-up, there is a discrepancy of 0.1 for dollar amounts.

D. Financing Plan

3.10 The proposed Bank loan of US$50 million would finance 100% of foreign exchange costs. NACF would contribute US$29.9 million (26.2%), and the beneficiaries US$34.3 million (30.0%). Table 3.2 summarizes the financing plans. The proposed Bank loan would be made to the Government and on-lent to NACF under a subsidiary loan agreement. NACF would raise its contribution partly from its commercial banking resources and partly from the Special Funds generated by the repayment of subloans under the previous Bank supported projects./1 The current loan would specify that the terms for relending from the Special Funds would be identical to those applying to the proceeds of the proposed loan. The actual mix of funds from these two sources would be governed by the need to ensure a sufficient margins between the weighted average cost of funds to NACF and Participating Cooperatives

/1 Under the previous two projects (Cr. 355-KO and Loan 1328-KO, Special Funds were established in which repayments by subborrowers are being deposited. The available revolving special fund is projected as follows:

	1982	1983	1984	1985	Total
Million Won	2,682	2,217	1,451	246	6,596
Million US$ equivalent					10.1

and the interest rate payable by the subborrowers, to meet the credit administration costs of NACF and the participating cooperatives, at present estimated to be 4% of loans granted (para. 4.14).

Table 3.2: FINANCING PLAN

	Billion Won	US$ million	Percentage
Bank	32.50	50.0	43.8
NACF	19.43	29.9	26.2
Beneficiaries	22.29	34.3	30.0
Total	74.22	114.2	100.0

E. Procurement

Fruits and Vegetables Subprojects

3.11 Greenhouses and On-farm Storage. These involve simple structures, too widely scattered to attract international bidding or distantly located domestic contractors. They would therefore be constructed by local contractors and, in some cases, by the owners themselves.

3.12 Agro-processing, Packaging Material, and Chilled Storage. These would be too small for international bidding; however, many of the foreign firms in the business of chilled storage equipment are locally represented and would have the opportunity to promote sales. The construction, machinery and equipment for the chilled storage, packaging material and agro-processing subprojects would be procured through local competitive bidding, advertised accordingly under procedures satisfactory to the Bank; foreign contractors would be eligible to bid.

3.13 Sprinkler Irrigation. There are many local suppliers of sprinkler irrigation and prices are generally competitive; they would be procured through prudent shopping by the subborrowers through normal commercial sources.

3.14 Speed Sprayers. Speed sprayers are also available through many private channels. Their procurement would be spread over several years and scattered over too many buyers to make it worthwhile for external bidders. Speed sprayers, too, would be obtained by prudent shopping through normal commercial sources, but NACF would require that, in cases involving cooperatives, the subborrowers obtain price quotations from at least three suppliers.

F. Implementation Schedule and Disbursement

Implementation Schedule

3.15 The project's subloan commitment period would be four years starting in July 1981. It is expected that the last commitment of funds would take place in July 1985, and the project will be fully disbursed by December 1985 (six months after the last commitment). Annex 4 shows the estimated disbursement schedule as summarized below:

Year FY	Annual ----- US$ Mln -----	Cumulative	Percentage
1982	6.0	6.0	12.0
1983	10.0	16.0	32.0
1984	12.5	28.5	57.0
1985	14.0	42.5	85.0
1986	7.5	50.0	100.0
Total	50.0	50.0	100.0

Disbursement

3.16 Because of the large number of small subloans anticipated under the proposed project, disbursement of the Bank loan proceeds would be a uniform 63% of the amount of subloans made by cooperatives and NACF under the project. Withdrawal application would be supported by Statements of Expenditures (SOE), certified by NACF Project Manager. All other related supporting documents, (including copies of contract documents, suppliers' invoices, evidence of shipment and payment for agro-processing, packaging materials and chilled storage subloans) would be retained in one central location and made available for review on request by Bank staff during supervision missions. The SOE would be audited by independent auditors (para. 4.18).

4. PROJECT IMPLEMENTATION

A. Organization, Management and Staffing

General

4.01 As in the previous two projects, NACF in general and its Technical Unit (TU) in particular would be responsible for the overall implementation of the project. The TU was established under the first project. It is headed by a Project Manager who is responsible to the General Manager of the Foreign Loan Department, who in turn reports to one of the NACF vice-presidents.

4.02 Under the First and the Second Project, the KC were wholly responsible for loan processing and disbursement, while TU's principal responsibilities included: (a) preparation of the annual lending program; (b) supervision and monitoring of project progress; (c) provision of technical advice and training of the Loan Appraisal Officers (LAO's) of the Kun cooperatives in subproject appraisal and supervision; (d) arranging withdrawal of project funds from GOK/Bank; and (e) preparing quarterly progress reports for submission to the Bank. These arrangements have proved satisfactory and would, therefore, be continued under the proposed project. However, there would be three changes: KC will carry out lending functions as branches of NACF; a selected number of the PC would participate (para. 4.11); and, because of their technical complexity, the TU would be directly responsible for evaluating and supervising: packaging material, chilled storage, and agro-processing (para. 4.13).

4.03 At present, the TU staff consists of a Manager, one Deputy Manager, five senior and four junior technical staff. The proposed project includes new and technically complex subprojects (processing, chilled storage and packaging material) for which the TU has had no prior experience. The TU would therefore be strengthened by: (a) the appointment of an Agricultural Engineer to its staff; and (b) increased technical backing by NACF in-house expertise. The agricultural engineer would be responsible mainly for supervising the technical aspects of packaging material, agro-processing and chilled storage subprojects; he would also review the engineering aspects of the sprinkler irrigation, and liaise with the various outside specialized technical agencies. Assurances was obtained from the Borrower that NACF would appoint, within six months following loan effectiveness, an agricultural engineer, with qualification and experience acceptable to the Bank, and post him to the TU (para. 7.01(a)).

4.04 The TU handles only about 5% of the total agricultural term lending of NACF while the balance falls under other departments. Hitherto the TU has been carrying out its various activities with little direct involvement of these other departments. As a result, the institution strengthening aspects of the previous projects have had little impact on these other departments that handle the preponderant part of NACF agricultural lending programs. Partly to diffuse the institutional development impact within NACF, a Project Implementation Committee (PIC), in which appropriate staff from the other relevant departments would fully participate, would be established; this would help to expose such staff especially to project appraisal techniques which have been successfully used by the TU for Bank-supported activities. The Committee membership would include representatives of the NACF's Livestock, Horticulture, Agricultural Machinery, Community Development, Technical, Special Cooperatives, Credit Planning, and Research divisions. The Committee would be chaired by the Vice-President in charge of the Foreign Loan Department, while the TU project manager would serve as the secretary.

4.05 The Committee would also be responsible for coordinating the project activities with those of the NACF programs financed from local funds. In

addition, it would serve as the focal point through which the other departments of NACF would provide support to the TU (para. 4.03). The various members of the Committee would also serve as the principal professional liaison persons with their respective professional counterparts in MAF, ORD, ADC and other governmental agencies. This way, TU staff would be relieved of being solely responsible for liaison with such agencies; the arrangement would also ensure more effective liaison in that the Committee members would be in a better position to communicate professionally with the technical staff of these other agencies. An assurance was obtained from the Borrower that such a committee would be established within six months following the project effectiveness (para. 7.01(b)).

4.06 A Project Coordinating Committee (PCC) had been established under the previous projects. It comprised representatives of NACF, MAF, ORD, EPB, Ministry of Finance and ADC. It however ceased functioning during the second project mainly because the need for interministerial coordination was sufficiently met through MAF. There is therefore no need to reactivate this committee.

4.07 The cooperatives would themselves directly undertake some of the subprojects, namely: the agro-processing, chilled storage and speed sprayer subprojects. In the latter case, the cooperatives would achieve economies of scale by owning speed sprayers and making them available to the farmers under custom service.

4.08 The Agricultural and Fishery Development Corporation (AFDC) is the agency primarily responsible for financing agro-processing and chilled storage investments in Korea. A Bank loan of US$50 million for AFDC was approved in April 1980. However, cooperatives cannot avail themselves of these fund as they are legally prohibited from borrowing from any source other than NACF. The proposed project would therefore provide loans to cooperatives for agro-processing and chilled storage subprojects. To ensure that AFDC and NACF would avoid over-investments and wasteful competition among their borrowers as well as with existing enterprises, assurance was obtained from the Borrower that NACF would confine its lending to cooperatives, and that NACF and AFDC would keep each other sufficiently informed regarding their lending proposals for these subprojects, and coordinate their lending accordingly; and that in case of disagreement, either NACF, AFDC or both would refer the matter to MAF for final ruling (para. 7.01(c)).

Field Extension Support

4.09 NACF relies mainly on the Office of Rural Development (ORD) of MAF (paras. 1.28-1.29), but also on technical staff of its member cooperatives (para. 2.07) to provide technical extension support to the farmer borrowers. Mainly because of insufficient liaison between ORD and NACF, the required specialized technical support from ORD has not been available in a number of cases where it was much needed. The proposed committee (paras. 4.04 and 4.05) would help to improve the liaison between NACF's TU and ORD through professional contact between the relevant committee members and the staff of ORD.

B. Lending Procedures, Terms and Conditions

Lending Procedures

4.10 The Government would make available the proceeds of the Bank loan to NACF for onlending to participating cooperatives and NACF's direct subborrowers. Assurance was obtained from the Borrower that the subborrower would contribute at least 30% of the subproject costs, and that NACF would contribute US$29.9 million equivalent (para. 3.10) towards the project partly from the NACF commercial banking resources and partly from the funds generated by the repayment of subloans under the previous Bank supported projects (Credit 335-KO and Loan 1328-KO); (para. 7.01(d)). An assurance was also obtained from the Borrower that the participating NACF branches would meet the criteria set out in para. 7.01(e).

4.11 In the interest of strengthening the institutional building aspect of the project, selected PC would participate in the project under close supervision by NACF in general and KC in particular. It is expected that their participation would be introduced mainly in 1982. Before involving any PC, NACF would determine the criteria for selecting them, special procedures to be adopted for lending by PC, and the allowed interest rate spread. An assurance was obtained from the Borrower that prior to involvement of Primary Cooperatives (PC), NACF would submit to the Bank, for its approval, details regarding the proposed: criteria for selecting participating PC; special lending procedures; and interest spread allowed to PC (para. 7.01(f)).

4.12 Until now, the LAO in the KC have been undertaking detailed appraisal of each and every subloan. This is partly intended to afford the LAO extensive opportunities to learn project appraisal techniques. While these procedures have worked well, they necessitate substantial time to appraise subloans, as it takes about three months to process a subloan. With a view to maximizing the use of staff resources and since most of the LAO have gained considerable experience in subloan appraisal, the TU would simplify gradually the appraisal procedures. To this end, instead of a case-by-case detailed analysis, the TU would develop representative farm models for various categories of on-farm subprojects taking into account any significant geographical variations in investment costs, production costs, cropping pattern, prices and other relevant factors. However, verification of collateral and creditworthiness would continue to be done on a case-by-case basis.

4.13 Chilled storage, agro-processing, and packaging material are new subprojects which were not included in the previous two projects. They also require expertise, to evaluate loan applications and supervise the subloans, that is not available among the participating cooperatives as NACF branches. Because of this, appraisal of chilled storages, packaging materials, and agro-processing subprojects would be undertaken by the TU. Furthermore, assurance was obtained from the Borrower that prior to approving these loans,

NACF would submit to the Bank for review and approval the first five loan applications for each of these subprojects (para. 7.01(g)).

Terms and Conditions

4.14 The interest rate payable by participating cooperatives to NACF would be at least 13% and by the subborrowers at least 16% per annum. These rates take into account the weighted average cost of Project funds to NACF and Participating Cooperatives, plus a 1% margin to NACF and 3% margin to the participating cooperatives to cover the project administration costs; they also meet the conditions specified here below. However, the Government may, from time to time and in consultation with the Bank, vary these minimum rates of interest provided that:

(a) the rate payable by the subborrowers to NACF and participating cooperatives would: (i) at least cover participating cooperatives' cost of project funds, as well as the participating cooperatives' cost of administering the project credit scheme; (ii) at least equal to the rate payable for local funds for similar subprojects under NACF's auspices; and (iii) be positive in real terms over the long-run; and

(b) the rate payable by participating cooperatives to NACF would at least cover the weighted average cost of Bank and other projects funds, as well as NACF's cost of administering the project credit scheme.

To this end, the Borrower, in consultation with the Bank, would review from time to time and at least once a year, the interest rate structure accordingly. Assurance was obtained from the Borrower to this effect [para. 7.01(h)].

4.15 NACF and the Borrower would also enter into a Subsidiary Agreement on terms and conditions satisfactory to the Bank; the execution of a subsidiary agreement would be a condition of effectiveness. Assurance was obtained from the Borrower to this effect (para 7.01 (i), and para 7.02).

4.16 The Government would bear the foreign exchange risk. An assurance was obtained from the Borrower that the Government would bear the foreign exchange risk on the proceeds of the Bank loan (para. 7.01(j)).

Subloan Approval Powers

4.17 Under the previous projects, individual loans were relatively small, generally below US$10,000 and there was therefore no need for NACF to seek Bank approval. Under the proposed project, a few of the subloans may exceed US$0.5 million. NACF would submit to the Bank for approval all loans exceeding US$500,000 in investment cost. Assurance was be obtained from the borrower that, all loans exceeding US$500,000 would be submitted to the Bank for review and approval; the free limit would be reviewed by NACF and the Bank at a mutually agreed time (para. 7.01(k)).

Loan Repayments

4.18 The repayment of each subloan would be determined according to the projected cash flow but would allow rescheduling of bona fide cases. Cash flow models for typical subloans indicate that loan repayments range from 5 years (including 1 year grace) for onfarm storage and sprinkler irrigation for vegetables to 9 years (including 5 years of grace) for sprinkler irrigation for orchards. The repayment period of the Bank loan by the Government would be 15 years including 3 years grace. The repayment period of Bank loan by NACF to the Government would be same.

C. Project Accounting

4.19 NACF's accounts are audited by independent auditors acceptable to the Bank. This would be continued under the proposed project and would be expanded to include annual auditing of Statements of Expenditure and other related documents submitted to the Bank in support of application for reimbursement, with a view to ascertaining whether these documents and the related internal control procedures are sound. NACF would also maintain separate accounts for the project funds in a manner sufficient to show the actual utilization of the project funds, and would forward to the Bank within four months following the closing of the financial year audited accounts including the audited balance sheets and income statements covering its total operations. Assurance was obtained from the Borrower to this effect (para. 7.01(l)).

D. Monitoring, Evaluation and Reporting

Monitoring and Evaluation

4.20 The TU's current monitoring system consists of monthly and bimonthly reports from participating Kun cooperatives, and field visits by TU staff. While the monitoring system has generally operated satisfactorily it does not generate, in sufficient details and at appropriate intervals, the information needed to assess realized benefits and costs relating to the subprojects and to determine actual input-output technical coefficients. The system therefore needs to be improved to generate such information. An assurance was obtained from the Borrower to this effect (para. 7.01(m)).

Reporting

4.21 NACF sends quarterly progress reports to the Bank in the format established during the First Project. These are satisfactory and would continue under the project, but subject to review after two years. The scope of the first quarterly report would be widened to include information on NACF's and Primary Cooperatives' total lending operations. NACF would also prepare a project completion report.

4.22 As noted above (para. 2.32) the NACF general information system relating to its other non-Bank supported agricultural lending activities does not generate sufficiently detailed data on several important aspects. In the interest of enhancing the overall operational efficiency of NACF, an assurance was obtained from the Borrower that NACF would undertake the necessary improvements within three years of effectiveness (para. 7.01(m)).

5. PRODUCTION, DEMAND PRICES AND MARKETING

A. Production, Demand and Prices

5.01 Yields. Yield assumptions are found in the notes to the models detailed in Annex 6. Briefly, iron-framed greenhouses are expected to achieve yields of 46.75 tons/ha of cucumbers and 43.5 tons/ha of green peppers by the third crop year (new greenhouse farmers) or in the first crop year (farmers converting from bamboo greenhouse). Bamboo framed structures are assumed to produce 15% less. The above yields are on the conservative side as they basically reflect the national averages; some farmers, for example in Gyeongsam-nam Province, are able to obtain yields of 70 tons/ha of cucumbers and over 40 tons/ha of green peppers. Sprinkler irrigation of vegetables is assumed to increase yields by 20% over the 1975-79 national averages (assumed to apply without sprinkler irrigation). Sprinkler irrigation of new dwarf apple orchards raises assumed yields by 17%.

5.02 Production and Demand. At full development (1992) the incremental output from the assumed subprojects mix (Annex 3, footnote (a)) is shown in Table 5.1. No major problem is envisaged regarding the effect of project production on prices. As Table 5.1, column 5 indicates, the project's incremental output would be small compared to total demand. Greenhouses would produce vegetables in the season when there is no other source of supply to meet the rapidly rising preferences for fresh vegetables. Furthermore, greenhouses can produce a wide variety of vegetables and sprinkler irrigation can be applied to fruits other than apples as well, thus providing the flexbility to adjust production, particularly for vegetables, in the event of unfavorable supply and demand conditions.

5.03 Prices. As Table 5.2 shows, fruit and vegetable prices have been rising sharply since 1975. This trend is expected to remain firm as a result of population growth, per capita income increases and relatively high income elasticities of demand for fruits and vegetables. The off-season supply of vegetables from greenhouses and of fruits from on-farm and chilled storage would tend to reduce the degree of seasonal price fluctuations.

Table 5.1: INCREMENTAL PRODUCTION AND DEMAND PROJECTION

	Full development year (1)	Annual incremental output (2)	Domestic demand at full development /a (3)	Domestic production in 1979 (4)	(2) as % of (3) (5)
		('000 tons)			
Greenhouses		23.30	395.5	36.67 /c	5.9
Cucumber	1988	12.07	142.5	28.99	8.5
Green pepper	1988	11.23	253.0	7.68	4.4
Upland Irrigation		44.06	7,401.8	4704.70	0.6
Vegetables /b	1986	27.00	6,549.4	4261.04	0.4
Apples	1992	17.06	852.4	443.66	2.0

/a Based on estimated income elasticities of demand and projected population and per capita income (see Annex 5 for details).

/b Carrot, chinese cabbage, cabbage, potato, welsh onion, red pepper.

/c 1978 greenhouse production, equal to 35% of total cucumber production and 7% of total green pepper production.

Table 5.2: PRODUCER PRICE INDEX

Year	Fruits	Vegetables
1975	100.0	100.0
1976	112.2	125.9
1977	134.6	144.5
1978	159.5	226.0
1979	197.0	245.3

Source: Bank of Korea: Economic Statistics Yearbook, 1980.

B. Marketing

5.04 Agricultural products in Korea are marketed through private traders and the NACF cooperative network. The cooperatives accounted for about 21% of the total farm produce and 40% of fruits and vegetables marketed in 1979. Marketing of the Project output of fruits and vegetables would be channelled mostly through the Horticultural and Primary Cooperatives, and private traders. Farmers' produce for sale is usually picked up at the farms by the Cooperatives and transported to the marketing centers, and then sold on an individual consignment basis through auction sales in urban marketing centers operated by NACF (including some by Kun and Primary Cooperatives). The farmer is paid the auction price less commission for marketing services rendered by NACF and the Cooperatives, and transport costs. The commission is fixed by NACF; at present it is 6% of the auction price. The majority of the farmers prefer to market their produce through private traders, who pay on the site at harvest time and assume all subsequent spoilage losses and other marketing risks.

5.05 However, there is a need to improve the marketing of fruits and vegetables in the country, particularly with a view to reducing spoilage and wastes, shortening the distribution channels, introducing grading, standardization and better packaging methods, and enhancing competitive price formation especially in the major urban wholesale markets. Most of the central marketing facilities in such cities as Seoul are too congested and outdated. The proposed project would help to improve the situation by financing sorting equipment for fruits, better storage facilities, and manufacturing of better packaging materials for both fruits and vegetables. A marketing project to be supported by the Bank is under preparation; it is expected to include a country-wide study of the fruits and vegetables marketing system with the aim of identifying needed improvements and formulating a national master plan for implementing these improvements.

6. JUSTIFICATION, BENEFITS AND RISKS

A. Justification

6.01 The project would raise farm incomes, and address several sectoral issues, by:

(i) increasing the supply of high-value products for which demand is growing rapidly;

(ii) increasing off-season employment mainly through greenhouse subprojects; and

(iii) reducing the peak-season labor shortage, among orchard farmers, through speed sprayer subprojects.

6.02 The project would directly benefit, among others, about 6,500 vegetable producers, 7,300 orchard farmers, and 124 Cooperative sub-borrowers. To these must be added the value of institutional development expected from project activities in support of Kun and Primary cooperatives' lending operations.

B. Financial Analysis

6.03 Annex 6, Table 8 shows the financial prices used in the analysis while Tables 1 to 7 show detailed financial analysis. Table 9 shows the aggregate net incremental benefits of the project. Table 6.1 summarizes the financial rates of return of typical investments to be financed.

Table 6.1: FINANCIAL RATES OF RETURN
(%)

Subproject	Base case	Gross revenues -10%	Costs +10%	Income -10% Costs +10%	Income -20% Costs +20%
New greenhouse	30	20	21	11	-15
Replacement greenhouse	53	46	47	40	34
Sprinkler irrigation					
Vegetables	34	26	27	20	12
Apples	23	21	21	19	16
On-farm apple storage	83	69	70	58	47
Chilled storage	43	32	33	24	16
Speed sprayer					
8 ha /a	55	49	50	44	38

/a Gross income is cost savings.

6.04 The rates of return are satisfactory and range from 23% for sprinkler irrigation of apples to 83% for on-farm apple storage. The aggregate financial rate of return would depend on the mix of subprojects as determined by the farmers' wish to borrow project funds for the various subprojects. Experience from the first and second projects indicates that

the mix may change in keeping with changing domestic and international economic conditions. The mix here assumed is therefore essentially illustrative; it gives an aggregate financial rate of return of 42%.

C. Economic Analysis

6.05 Detailed models using economic prices are found in the project files, and rates of return and sensitivity test are summarized in Table 6.2. Economic rates of return are quite similar to those derived from the financial analysis, ranging from 24% for sprinkler irrigation of apples to 78% for on-farm storage. The aggregate rate of return is 41%.

6.06 Most economic prices were derived by applying Bank-generated conversion factors to financial prices. For all outputs, the consumption conversion factor of 0.87 was applied. This is rather conservative in the case of apples (the only output with significant trade), so the apple sprinkler irrigation rate may be understated. For farm labor, seasonal labor surplus (many subprojects would use labor primarily in the off-season) indicated a conversion factor of 0.82. Skilled labor was taken at its financial price. A conversion factor of 0.91 was applied to most capital goods (greenhouse investments, sprinkler irrigation capital goods, apple storage and chilled storage investments, and power sprayers and their hoses). The standard conversion factor of 0.89 was applied to certain costs having a mixed capital-consumption-labor content, including biocides, maintenance and repairs, and on-farm apple storage sterilization. Electricity was priced at ₩ 37.12 (US$0.064) per kWh, computed by the Bank as its marginal cost of production. Fertilizers and fuels were entered at world prices adjusted for transport, insurance and handling charges, except for compost, which was priced at 90% of its financial value. Power tiller service was entered at 87% of its financial value, since it represents costs of labor, capital and fuel. Speed sprayer financial prices were adjusted by deducting taxes, commissions and most customs charges totaling ₩ 2 million per machine. The opportunity cost of capital was taken at 15%.

D. Risks

6.07 No major risks are anticipated. As the sensitivity analysis demonstrates all the subprojects are able to sustain a 10% reduction in revenues or increase in costs and still give satisfactory rates of return; only new greenhouse subprojects exhibit an unsatisfactory rate of return if both revenues and costs respectively fall and rise by 10%. Nevertheless, the returns for orchard sprinklers irrigation subprojects are known to be highly sensitive to yield responses as determined by the moisture retention capacity of the soil. Furthermore, the returns for speed sprayer subprojects significantly depend on full utilization which may not be realized given the small average size of individual orchards in Korea. The risk pertaining to

the sprinkler irrigation would be minimized by ensuring adequate technical advisory services to the farmers, while the risk pertaining to the speed sprayers would be minimized through group utilization under the cooperatives or other groups.

Table 6.2: ECONOMIC RATES OF RETURN
(%)

Subproject	Base case	Gross income -10%	Costs +10%	Income -10% Costs +10%	Income -20% Costs +20%
New greenhouse	35	25	26	16	-5
Improved greenhouse	48	41	42	36	27
Sprinkler irrigation					
Vegetables	32	25	26	19	11
Apples	24	22	22	19	14
On-farm apple storage	78	65	66	55	39
Chilled storage	34	24	25	17	4
Speed Sprayer					
8 ha	49	43	44	39	31

7. AGREEMENTS REACHED AND RECOMMENDATIONS

A. Agreements Reached

Agreements Reached

7.01 Assurances were obtained from the borrower that:

(a) NACF would, within six months following loan effectiveness, appoint an agricultural engineer with qualification and experience acceptable to the Bank, and attach him to the TU (see para. 4.03);

(a) a Project Implementation Committee, in which appropriate NACF staff from the various NACF departments, would be established within six months following effectiveness of the project (para. 4.05);

(c) to avoid overinvestment in agro-processing and chilled storage, NACF and AFDC would keep each other informed regarding their respective lending proposals and ensure that there would be no wasteful competition for raw materials among their borrowers and existing agro-processing facilities; furthermore, NACF would confine its lending to cooperatives. In case of disagreement, they would refer the matter to MAF for final ruling (para. 4.08);

(d) The subborrowers would contribute at least 30% of the subproject's costs and NACF would contribute an aggregate amount of US$29.9 million (26.0% of each subloan) equivalent towards the project partly from its commercial banking resources and partly from the special fund generated by subloan repayment under Credit 335-KO and Loan 1328-KO (para. 4.10);

(e) the participating NACF branches would meet the following criteria:

  (i) overdues would not exceed 10% of total outstanding loans during the immediately preceding year;

  (ii) at least one LAO would work full time on project loans, with the number of LAOs being increased commensurate with appraisal work load;

  (iii) adequate extension services would be made available to the farmers (para. 4.10);

(f) prior to involving Primary Cooperatives in project lending, NACF would submit for Bank approval criteria for selecting the participating Primary Cooperatives, interest rate spread allowed for these cooperatives, and envisaged lending procedures (para. 4.11);

(g) NACF would forward to the Bank for review and approval at least the first five subprojects for packaging materials, agro-processing and chilled storage before it approves any loan application for these subprojects (para. 4.13);

(h) the interest rate payable by the subborrowers would be at least 16.0% and interest rate payable by participating cooperatives at least 13.0% per annum. The Government may, from time to time and in consultation with the Bank and NACF, vary these minimum rates of interest provided that the interest rate structure ensures that:

  (i) the rate payable by the subborrowers to NACF and participating cooperatives would:

    - at least cover participating cooperatives' cost of project funds, as well as the participating cooperatives' cost of administering the project credit scheme which is at present estimated at 4% of project loans granted;

    - at least equal the rate payable for local funds for similar subprojects implemented under NACF's auspices; and

- be positive in real terms over the long-run;

(ii) the rate payable by the participating cooperatives to NACF would at least cover the weighted average cost of Bank and other project's funds, as well as NACF's cost of administering the project credit scheme which is at present estimated at 1% of project loans granted;

To this end and in consultation with the Bank and NACF, the Borrower would accordingly review the above interest rate structure from time to time and at least once a year (para. 4.14);

(i) NACF and the Borrower would enter into a Subsidiary Agreement on terms and conditions satisfactory to the Bank (para. 4.15).

(j) the Government would bear foreign exchange risk relating to proceeds of the Bank loan under the project (para. 4.16);

(k) prior to approval by NACF all subloans exceeding US$500,000 would be submitted to the Bank for review and approval; the free limit will be reviewed NACF and the Bank as may be warranted (para. 4.17);

(l) NACF would have its accounts, statement of expenditure and other related documents used to support application for reimbursement from the Bank, audited by independent auditors acceptable to the Bank; maintain separate accounts for the project funds in a manner sufficient to indicate the uses of the project funds; and forward the Bank within four months following the closing of the financial year audited accounts including balance sheet and income statement for NACF total operations (para. 4.19);

(m) NACF would design, during the first year of the project effectiveness, a monitoring and evaluation system that would generate, in sufficient details and at suitable intervals, data relating to, inter alia, costs and benefits and actual input-output technical coefficients (para. 4.20); and

(n) NACF would, within three years of project effectiveness, take the necessary action to improve its information system relating to its non-Bank supported agricultural lending activities so as to provide sufficiently detailed and systematic data regarding, inter alia: purpose of loans, disbursements, amount due and arrears, maturity structure, and consolidated lending for cooperatives as a whole (para. 4.22).

B. Conditions of Effectiveness

7.02 The following shall be the conditions of effectiveness:

(a) Execution of a Subsidiary Agreement between NACF and the Borrower on terms and conditions satisfactory to the Bank.

C. Recommendations

7.03 In view of the above assurances, the proposed project is suitable for a Bank loan of US$ 50 million.

ANNEX 1
Table 1

KOREA

THIRD AGRICULTURAL CREDIT PROJECT

Farm Households, Population and Cultivated Area

Year	Number of farm households (million)	Population (million)	Cultivated area (million ha)
1968	2.58	15.91	2.32
1969	2.55	15.89	2.31
1970	2.48	14.42	1.12
1971	2.48	14.71	2.27
1972	2.45	14.68	2.24
1973	2.45	14.64	2.24
1974	2.38	13.46	2.24
1975	2.38	13.24	2.24
1976	2.34	12.75	2.24
1977	2.30	12.31	2.23
1978	2.22	11.53	2.22

Source: Bank of Korea; Economic Statistics Year Book; 1980.

KOREA

THIRD AGRICULTURAL CREDIT PROJECT

Consumer Price Index (All Cities)
1975 = 100.0

Year	All items
1968	37.6
1969	42.3
1970	49.1
1971	55.7
1972	62.2
1973	64.2
1974	79.8
1975	100.0
1976	115.3
1977	127.0
1978	145.3
1979	171.9

Source: Bank of Korea: Economic Statistics Year Book; 1980.

KOREA

THIRD AGRICULTURAL CREDIT PROJECT

Agricultural Production Index
(1974-76 Average = 100)

Year	All items	Grains	Vegetables	Fruits	Livestock products
1968	68.1	77.8	81.0	65.6	44.0
1969	77.6	91.8	77.7	67.9	68.0
1970	76.1	88.4	74.8	70.3	70.6
1971	78.6	87.3	91.3	65.6	74.6
1972	80.2	86.2	86.9	80.4	82.7
1973	83.7	88.6	86.7	50.8	79.8
1974	88.7	91.8	92.2	56.8	90.5
1975	96.0	100.0	88.3	96.0	101.4
1976	108.7	108.1	117.7	104.0	108.0
1977	113.2	112.8	116.0	136.0	130.1
1978	116.2	112.2	105.3	143.1	157.7

Source: Bank of Korea; Economic Statistics Year Book; 1980.

ANNEX 2
Table 1

KOREA

THIRD AGRICULTURAL CREDIT PROJECT

Composition Analysis of Loans Granted by
NACF, Kun and Primary Cooperatives During Each Year /a
(In billion won)

	1975	1976	1977	1978	1979
	-------	(January - December)			---------
Banking Funds					
Short-Term					
Agricultural production credit	77.2	80.1	124.1	147.7	214.6
Working capital to cooperatives	8.8	15.6	25.9	31.4	40.7
Working capital to fisheries	22.2	12.7	6.3	5.0	-
Export credits/bills	128.3	118.5	134.4	84.6	84.2
Import of farm inputs	-	-	-	16.5	22.1
Commercial loans, overdrafts, installment loans, etc.	228.5	265.2	301.6	468.2	644.7
Mutual credit loans /b	NA/e	NA	140.0	311.8	464.6
Subtotal	465.0	492.1	732.3	1,065.2	1,470.9
Medium-/Long-Term Investment Credit					
Farmers, agri-entrepreneurs/organizations	11.8	13.2	11.2	27.5	41.2
Cooperative investments	9.2	6.3	10.1	9.9	9.8
Fishery (facilities)	2.4	1.4	1.2	-	2.6
Agricultural machinery/modernization	-	-	-	0.2	-
Special long-term loans, installment loans, with foreign currency	3.7	5.3	2.6	3.3	6.3
Subtotal	27.1	26.2	25.1	40.9	59.9
Total Banking Funds	492.1	518.3	757.4	1,106.1	1,530.8
Government Funds					
Short-Term					
Production/marketing	9.7	27.8	70.5	90.9	66.3
Medium-/Long-Term Investment Credit /c					
Irrigation	5.5	8.0	11.5	8.2	16.8
Other agricultural and rural investments	13.1	18.2	33.8	39.5	45.5
Total Government Funds	28.3	54.0	115.8	138.6	128.6
National Investment Fund					
Short-term (working capital)	16.5	27.4	9.2	16.4	16.0
Investment	12.9	18.1	13.2	16.5	20.8
Total National Investment Fund	29.4	45.5	22.4	32.9	36.8
Agri-Investments With Foreign Loans /d	4.8	3.4	10.2	9.9	12.7
Rural Housing	-	-	-	83.4	105.2 /f
GRAND TOTAL	554.6 /e	621.2	905.8	1,370.9	1,814.1

/a Includes loans renewed and new loans disbursed during each year. The data are based on a broad classification of loans, related to source of funds as reported by Kun cooperatives and NACF's direct loans, and have been reclassified as necessary.
/b Purpose-wise breakup not available.
/c Includes funds allocated for Saemaul movement loans.
/d Includes NACF funds and counterpart funds.
/e Figure indicated in para. 2.11 (W626 billion) includes an estimated W 81 billion of mutual credit loan disbursement in 1975, but excludes W 8 billion to primary cooperatives for operation and facilities.
/f Figure indicated in para. 2.11 (W 1,772 billion) excludes loans to Primary Co-ops (W 42 billion) for operation and facilities.

KOREA

THIRD AGRICULTURAL CREDIT PROJECT

Outstanding Loans of NACF, Kun and Primary Cooperatives by Source of Funds and Purpose
(In million won)

December 31,	1975	1976	1977	1978	1979
From Banking Funds					
Agricultural Loans					
Short-term production	12,469	18,000	21,049	35,093	56,898
Short-term production (mutual credit)	28,300	42,700	86,000	137,800	236,800
Medium-term production and equipment	40,443	49,289	44,694	51,365	73,219
Short-term loans to village cooperatives /a	22,704	31,002	45,289	57,897	65,093
Farm enterprises	13,781	16,504	32,406	27,486	33,427
Loans to agricultural organizations	3,177	2,969	5,354	4,531	6,722
Agricultural credit bonds (mainly usury debt settlement)	648	610	316	160	83
Total Agricultural Loans	121,522	161,074	235,108	314,332	472,242
Short- and medium-term fishery loans	6,353	5,690	5,874	5,420	6,164
Other Short-Term Loans					
Export loans	40,898	49,438	45,765	27,889	24,923
Trade	1,715	1,005	953	7,885	8,985
Total Other Short-Term Loans	42,613	50,443	46,718	35,774	33,908
Savings promotion loans	57,178	72,455	85,664	109,245	145,153
Agricultural machinery industry	222	142	65	23	10
Long-term credit debentures	3,145	2,464	1,791	1,156	746
Mutual credit (general purposes)	13,600	25,100	30,600	49,000	79,900
Others	1	2,439	-	1,798	6,263
Total Banking Fund Loans	244,634	319,807	405,820	516,748	744,386

December 31,	1975	1976	1977	1978	1979
From Budgetary Funds					
Counterpart Funds					
Long-term fund	1,382	1,490	1,598	1,479	1,246
Short-term fund	1,542	1,134	970	978	1,017
Total Counterpart Funds	2,924	2,624	2,568	2,457	2,263
Special Operating Funds					
Forestry	1,096	960	698	650	542
Ginseng	2,847	3,498	6,592	9,471	13,579
Agricultural mechanization, warehouses (AID)	-	-	-	4,529	5,376
Saemaul integrated development	-	-	-	5,944	-
Others	17,751	20,688	20,281	9,696	7,250
Total Special Operating Funds	21,694	25,146	27,571	30,290	26,747
Agricultural price stabilization	1,042	1,310	1,062	332	697
Long-term irrigation loans	22,717	29,639	40,395	47,341	61,627
Production loans (short-term)	-	483	13,376	26,688	1,194
Foreign loans	13,384	15,808	24,784	32,079	40,428
National Investment Fund	18,397	33,211	38,335	45,844	54,981
Agricultural Development Fund	-	-	23,545	42,009	71,394
Rural housing loans	-	-	-	82,977	185,176
Forestry Development Fund	-	-	-	2,735	3,726
Others	1,215	1,403	236	468	442
Total Budgetary Fund Loans	81,373	109,624	171,872	313,220	448,675
GRAND TOTAL	326,007	429,431	577,692	829,968	1,193,061/b

/a Includes loans to village cooperatives from mutual credit funds as well as loans to special cooperatives.

/b Total indicated in text (Table 2.3) excludes loans to Primary Coops for operation and facilities.

KOREA

THIRD AGRICULTURAL CREDIT PROJECT

Collections and Overdues of NACF, Kun Primary Cooperatives
(In billion won)

	NACF /a			Kun cooperatives			NACF and Kun cooperatives			Mutual Credit			NACF, Kun and Mutual Credit		
	1975	1977	1979	1975	1977	1979	1975	1977	1979	1975	1977	1979	1975	1977	1979
1. Loans outstanding at the beginning of the year	95.7	120.2	124.1	156.3	241.3	519.0	252.1	361.6	643.1	34.1	67.8	186.8	286.2	429.4	829.9
2. Loans advanced during the year	284.3	281.4	338.9	270.2	484.4	1,010.6	554.5	765.8	1,349.5	n.a.	140.0	464.6	n.a.	905.8	1,814.1
3. Loans recovered during the year	277.3	265.2	307.1	245.2	401.1	809.2	522.6	664.4	1,116.3	n.a.	91.2	334.7	n.a.	757.6	1,451.0
4. Loans outstanding at the end of the year	102.7	136.4	155.9	181.3	324.6	720.4	284.1	461.0	876.3	41.9	116.6	316.7	326.0	577.6	1,193.0
5. Loans overdue at the end of the year /b	1.6	3.9	1.6	8.6	9.2	8.1	10.3	13.2	9.7	14.0	35.7	31.1	24.3	48.9	40.8
6. Proportion of (5) to (4)	1.7	2.9	1.0	4.8	2.9	1.1	3.6	2.9	1.1	33.4	30.6	9.8	7.4	8.5	3.4

/a Figures exclude loans from NACF for supporting Kun cooperatives and their business.

/b Loans overdue at the end of the year indicate the shortfall in collections with reference to the targets fixed by NACF for this purpose. These target, while taking into 'amounts due,' are fixed such as to bring the outstanding loans to the level of credit ceiling authorized by BOK. NACF indicated that the targets are generally close, maybe higher, to actual 'amounts due.'

Source: NACF.

KOREA

THIRD AGRICULTURAL CREDIT PROJECT

NACF Audited Balance Sheet /a
(In billion won)

December 31,	1975	1976	1977	1978	1979
Assets					
Cash and deposits	36.0	101.5	266.3	293.7	213.2
Receivables:					
Loans and overdrafts	333.6	401.6	409.8	591.4	853.1
Trade and others	64.9	83.5	110.2	124.5	146.9
	398.5	485.1	520.0	715.9	1,000.0
Less: Allowance for doubtful accounts and loan losses	8.6	4.8	5.9	5.3	4.5
Subtotal	389.9	480.3	514.1	710.6	995.5
Inventories	109.3	118.0	135.9	145.3	177.7
Due from Government of Republic of Korea	189.5	129.8	149.5	166.3	197.9/b
Investment in securities	9.7	15.2	96.0	341.3	452.0
Property and equipment, at cost less depreciation	9.0	11.7	13.5	16.1	18.9
Other assets	7.8	14.7	11.0	12.0	12.5
Total Assets	751.2	871.2	1,186.3	1,685.3	2,067.7
Liabilities					
Deposits	367.8	467.3	555.9	840.3	1,022.6
Trade payables	42.5	39.7	62.6	95.8	65.7
Claims and insurance reserves	27.9	33.1	78.9	98.1	125.1
Accrued interest and other liabilities	15.0	15.1	33.5	75.7	113.4
Reserve for employees' severance liability	1.9	6.6	11.0	12.4	17.0
Borrowings and other debts	285.7	293.0	422.9	530.1	666.1
Subtotal	740.8	854.8	1,164.8	1,652.4	2,009.9
Equity					
Share capital	3.7	5.0	7.0	9.2	12.3
Share capital	3.7	5.0	7.0	9.2	12.3
Capital surplus	0.4	0.4	0.4	0.4	0.5
Reserves	0.8	0.9	1.0	1.3	2.6
Subtotal	10.4	16.4	21.5	32.9	57.8
Total Liabilities and Equity	751.2	871.2	1,186.3	1,685.3	2,067.7

/a As audited by external auditors, Messrs. San Kyong & Co.

/b Represents amount due in respect of monopoly purchase/sale of fertilizers entrusted to NACF, purchase/sale of pesticides, interest subsidy due under government sponsored loaning programmes, exchange losses and deposits with or loans due from government departments. Pending repayment of GOK dues, BOK has established a special line of credit in favor of NACF (W 240 billion), which has been fully drawn. The concessional rate of interest (5% p.a.) on this loan is also borne by GOK.

/c Retained earnings of W 42.4 billion included an amount of W 37.1 billion in respect of certain insurance reserves. These amounts according to insurance regulations, do not represent profits of NACF and therefore cannot be adjusted against losses of NACF in other departments or paid as dividends to NACF stockholders. Both NACF and auditors would review the position and commencing from FY80, reclassify the amounts as outside liabilities.

ANNEX 2
Table 5

KOREA

THIRD AGRICULTURAL CREDIT PROJECT

NACF Audited Income Statements of /a
(In billion won)

December 31,	1975	1976	1977	1978	1979
Income					
Sales and service fees	235.5	321.1	340.3	544.4	620.5
Subsidized fertilizer sales /b	180.1	141.7	163.9	212.0	246.6
Interest on loans, deposits and securities	31.9	44.5	64.8	121.9	211.3
Premiums written less unearned premium	8.3	9.6	25.6	31.7	44.8
Commission and others	7.7	11.1	40.1	20.0	20.1
Total Income	463.5	528.0	634.7	930.0	1,143.3
Expenses					
Cost of sales and services fees	250.0	336.4	358.0	542.5	616.6
Cost of subsidized fertilizer sales /b	161.3	118.3	146.8	211.4	242.4
Interest charges and commission	30.3	42.2	72.8	103.5	174.3
Insurance claims, reserves and dividends to policy holders	9.7	11.1	29.5	39.0	56.8
Selling, general and administrative expenses	9.8	16.0	23.3	24.9	32.0
Provision for doubtful loans and accounts receivables	0.5	0.5	1.6	0.8	1.2
Total Expenses	461.6	524.5	632.0	922.1	1,123.3
Operating profit	1.9	3.5	2.7	7.9	20.0
Other income (net)	(0.1)	0.1	0.9	2.2	2.9
Net Income	1.8	3.6	3.6	10.1	22.9
Defense tax	0.05	0.06	0.1	0.2	0.4
Net income after tax	1.7	3.5	3.5	9.9	22.5
	(3.1)	(3.3)	(5.9)	(6.2)	(9.9)/c

/a As audited by external independent auditors, M/S San Kyong & Co. In NACF books, revenues are recorded on a cash basis and expenses on an accrual basis. The audited statements reckon accrued income too.

/b Represent sale proceeds and purchase costs received/incurred during the financial year and do not reflect profit or loss on fertilizer business handled by NACF for GOK. The fertilizer accounting is done separately for receiving GOK compensation. External auditors would review the presentation of these data in the Annual Accounts commencing FY1980.

/c The figures in parenthesis represent the operating surplus in respect of NACF's insurance business. These amounts are mainly in the nature of reserves for the benefit of policy holders and cannot be utilized for NACF's other business or paid as dividend to stockholders. The external auditors and NACF would review the treatment of these items in the income statements commencing FY1980.

KOREA

THIRD AGRICULTURAL CREDIT PROJECT

Cost Estimates /a
(Million won)

	Unit cost/b	Year 1	Year 2	Year 3	Year 4	Total	% of total cost
Greenhouses /c							
New							
Metal frame	1.96	804	1,334	1,678	1,885	5,701	
Irrigation facilities /d	0.76	312	517	651	731	2,210	
Heating facilities /e	0.46	189	313	394	442	1,338	
Sprayers /f	0.12	49	82	103	116	350	
Insulation /g	1.08	443	735	924	1,038	3,141	
Polyethylene film /h	0.15	62	102	128	144	436	
Working capital /i	1.29	529	877	1,105	1,241	3,752	
Subtotal	5.82	2,389	3,959	4,982	5,597	16,926	22.8
Replacement							
Metal frame	1.96	477	754	952	1,072	3,255	
Irrigation facilities /j	0.34	83	131	165	186	565	
Heating facilities /j	-	-	-	-	-	-	
Sprayers /j	-	-	-	-	-	-	
Insulation /g	1.07	259	412	520	585	1,777	
Subtotal	3.37	819	1,297	1,638	1,843	5,597	7.5
Sprinkler Irrigation /k							
Vegetables							
Well /l	0.47	184	318	402	451	1,354	
Piping /m	0.43	168	290	367	413	1,239	
Pump station /n	0.66	259	447	563	634	1,902	
Sprinkler set /o	0.15	58	101	128	145	432	
Others /p	0.30	118	202	256	288	865	
Subtotal	2.01	787	1,359	1,716	1,931	5,792	7.8
Orchards							
Well /l	0.73	330	535	677	755	2,296	
Piping /m	0.87	394	637	805	900	2,736	
Pump station /n	0.77	349	564	713	796	2,422	
Sprinkler set /o	0.41	155	300	380	424	1,288	
Others /p	0.54	244	395	501	558	1,697	
Subtotal	3.32	1,502	2,431	3,075	3,432	10,439	14.1
On-Farm Storage							
Buildings /q	4.64	2,164	3,546	4,447	5,049	15,205	
Boxes /r	0.88	410	672	844	957	2,884	
Subtotal	5.52	2,574	4,219	5,291	6,006	18,090	24.4
Chilled Storage /s							
Buildings /s	40.99	790	1,317	1,656	1,844	5,606	
Equipment /s	28.02	540	900	1,132	1,260	3,831	
Boxes /s	8.90	172	286	359	400	1,217	
Subtotal	77.91	1,502	2,503	3,146	3,504	10,654	14.3
Speed Sprayers /t	7.95	390	650	845	975	2,860	3.9
Others /u		572	930	1,144	1,216	3,861	5.2
Total Cost		10,535	17,348	21,837	24,504	74,219	100.0

Footnotes

/a Based on the following subproject phasing:

	Year 1	Year 2	Year 3	Year 4	Total
Greenhouses					
New	411	680	865	962	2,909
Replacement	243	384	486	547	1,660
Sprinkler irrigation					
Vegetables	392	675	854	960	2,881
Orchards	452	733	926	1,034	3,145
On-farm storage	466	765	958	1,088	3,277
Chilled storage	19	32	42	44	136
Speed sprayer	54	90	117	135	396

/b Based on July 1980 unit costs.

/c Width 7m, length 70 m, and height 3.8 m; metal structure lasting about 15 years; replacement for existing bamboo and wooden greenhouses; production area 0.1 ha per subproject.

/d Consisting of about 0.5 hp electric pump and plastic hoses for trickle irrigation; pumps replaced in 10 years, and hoses in 5 years.

/e Optional; consisting of an oil stove replaced after 5 years.

/f Power sprayers for pest and disease control.

/g Consisting of synthetic fiber; 20% replaced each year.

/h Replaced each year.

/i Incremental expenses for the first-year crop.

/j Pump, heating stove and sprayer assumed existing; pump replaced in sixth year, stove and sprayer in third and eighth years.

/k Production area 1.0ha per subproject.

/l Concrete-lined well 6 m deep and 1 m (1.5 m for orchards) diameter.

/m PVC pipes, main lines buried, laterals and risers movable; orchard requires much higher risers.

/n Comprising kerosene or electric pump engine of 8 hp, a centrifugal pump 2" in diameter, pump engine base, fittings and valves and other connecting materials.

/o Vegetables: 40 sprinkler heads; irrigation assumed to be required 15 times per year at 13.2 hours each. Orchards: 56 heads; 8 irrigations per year at 26 hours each.

/p Consisting of cement, iron and aluminum, miscellaneous parts, including spares, and meters.

/q Concrete block building with insulation; average floor area about 66 sq m.

/r In the first year, about 1,200 boxes per subproject for storage and marketing produce.

/s See Appendix 1 to this Annex.

/t 500-liter spray tank capacity, 27 psi spraying capacity, and would spray 0.75 to 1.0 ha/hr.

/u Includes agroprocessing, packaging material, and livestock subprojects.

KOREA

THIRD AGRICULTURE CREDIT PROJECT

Investment Costs of Chilled Storage
(330 cu m)

	Year 1	2	3	4-10
	Won '000			
1. Building				
Preliminary works	3,039			
Soil works	645			
Land clearance, base works	807			
Steel-concrete works	10,053			
Brick works	4,126			
Water-proof works	2,994			
Roof-water works	2,417			
Fine dressing works	1,204			
Iron works	479			
Window works	1,756			
Glass works	78			
Others	2,203			
Subtotal	29,812			
Contractor's profit & others	7,453			
Tax	3,726			
Total	40,991			
2. Equipment /a				
Condensing unit	8,320			
Cooling pipe works	4,595			
Insulation works	350			
Unit cooler	5,121			
Cold water pipe works	2,094			
Ductor works	2,164			
Control	809			
Subtotal	23,452			
Contractor's profit & others	2,018			
Tax	2,547			
Total	28,017			
3. Storage Boxes	8,904	400	800	1,272
GRAND TOTAL	77,912	400	800	1,272

/a Equipment life estimated at ten years; all equipment is replaced in year 11.

KOREA

THIRD AGRICULTURAL CREDIT PROJECT

Estimated Disbursement Schedule
(US$ million)

IBRD FY	Quarterly	Cumulative
1982		
1st quarter	0.8	0.8
2nd quarter	1.0	1.8
3rd quarter	1.6	3.4
4th quarter	2.6	6.0
1983		
1st quarter	2.8	8.8
2nd quarter	2.2	11.0
3rd quarter	1.8	12.8
4th quarter	3.2	16.0
1984		
1st quarter	3.5	19.5
2nd quarter	2.8	22.3
3rd quarter	2.4	24.7
4th quarter	3.8	28.5
1985		
1st quarter	3.9	32.4
2nd quarter	3.1	35.5
3rd quarter	2.5	38.0
4th quarter	4.5	42.5
1986		
1st quarter	4.2	46.7
2nd quarter	3.3	50.0

ANNEX 5
Table 1

KOREA

THIRD AGRICULTURAL CREDIT PROJECT

Domestic Demand Projections ('000 tons)

Commodity	1978 /a	1981	1986	1988	1992
Apple	426.4	483.9	642.6	706.3	852.4
Cucumber /b	83.0	95.8	127.7	142.5	177.1
Green Pepper /c	109.7	122.2	205.3	253.0	384.6
Carrot	44.5	59.5	105.3	132.3	209.2
Chinese Cabbage	4,002.0	4,519.1	5,678.3	6,222.0	7,460.3
Cabbage	25.7	27.7	31.7	33.4	37.1
Potato	304.1	302.0	291.9	288.1	279.3
Welsh Onion	203.0	235.8	314.0	352.1	442.5
Red Pepper /d	112.4	118.1	128.2	132.5	141.1

/a Except in the case of apples, production is assumed to equal domestic demand. In bad years Korea must import some fruits and vegetables, but often it is a small net exporter.

/b Greenhouse production was 35% of the 1978 total.

/c Greenhouse production was 7% of the 1978 total.

/d The 1979 production is used instead of the 1978 figure because 1978 production was unusually low (38% of the production suggested by the 1971-79 trend line), while 1979 was near normal (97% of the trend line figure).

/e Exports in 1978 were 1,873 tons, but are not included here because export projections are particulary unreliable. Export demand is assumed to have no influence on domestic demand.

Source: Korea Rural Economics Institute, Korea Development Institute and mission estimates.

ANNEX 5
Table 2

Basic Data for Demand Projections

	1978	1981	1986	1988	1992
Per capita income (US$, 1975 prices)	776	884	1,153.2	1,283.6	1,590

	1978-9	1979-80	1980-85	1985-92
GNP growth rate (%)	7.1	0.5	7.0	7.0
Population growth rate (%)	1.6	1.6	1.55	1.5
Per capita income growth rate (%)	5.5	-1.1	5.45	5.5

Crop	Income elasticity /a
Cucumber	.734
Green pepper	1.706
Carrot	1.904
Chinese cabbage	0.565
Cabbage	0.210
Potato	-0.400
Welsh onion	0.785
Red pepper	0.020
Apple	0.595

/a Based on 1966-78 time series data; cross-section and other time series produce quite different elasticities in some cases.

Projection Formula

$D_t = (1+ng)^{t-o} (1+p)^{t-o}$, where D_t is demand t

years after 1978, D_o is demand in the base year, n is income elasticity, g is per capita income growth rate, and p is population growth rate. Because the coefficients n,g and p change with t, three separate formulae are used:

For 1981: $D_3 = D_o (1+D.055n)(1.016)(1-0.011)(1.016)(1+0.054n)(1.0155)$
For 1986 and 1988: $D_t = D_3(1+0.0545n)^{t-3}(1.0155)^{t-3}$, where t=8 and 10 respectively.
For 1992: $D^{14} = D^{10} (1+0.055n)^4(1.015)^4$

KOREA

THIRD AGRICULTURAL CREDIT PROJECT

New 0.1 ha Greenhouse - Cash Flow and Benefit/Cost Analysis
(Won '000)

Year	1	2	3	4	5	6	7-10	11	12-14	15
Cash Inflow										
Sales /a										
Cucumber /b	848	1,136	1,417	1,417	1,417	1,417	1,417	1,417	1,417	1,417
Green pepper /c	-	3,037	4,088	4,646	4,646	4,646	4,646	4,646	4,646	4,646
Subtotal	848	4,173	5,505	6,063	6,063	6,063	6,063	6,063	6,063	6,063
Loan (70% of first-year investment and operating costs)	4,075	-	-	-	-	-	-	-	-	-
Total Incremental Inflow	4,923	4,173	5,505	6,603	6,063	6,063	6,063	6,063	6,063	6,063
Cash Outflow										
Investment and Replacement Costs										
Iron frame /d	1,960	-	-	-	-	-	-	-	-	-
Irrigation facility /e	756	-	-	-	-	150	-	480	-	(300)
Heating facility /f	465	-	-	-	-	465	-	465	-	-
Sprayers /g	124	-	-	-	-	-	-	124	-	(60)
Heat insulation covers /h	1,072	-	-	-	-	-	-	-	-	-
Polyethylene film /i	154	-	-	-	-	-	-	-	-	-
Subtotal	4,531	-	-	-	-	615	-	1,345	-	(360)
Operating Costs										
Seed /j	39	64	64	64	64	64	64	64	64	64
Seed pot /k	7	14	14	14	14	14	14	14	14	14
Seed bed soil /l	91	182	182	182	182	182	182	182	182	182
Heating material /m	-	132	132	132	132	132	132	132	132	132
Supports /n	94	130	130	130	130	130	130	130	130	130
Fertilizer /o	68	128	128	128	128	128	128	128	128	128
Pesticide /p	17	45	45	45	45	45	45	45	45	45
Fuel /q	538	1,074	1,074	1,074	1,074	1,074	1,074	1,074	1,074	1,074
Labor /r	375	1,280	1,280	1,280	1,280	1,280	1,280	1,280	1,280	1,280
Polyethylene film /i	-	154	154	154	154	154	154	154	154	154
Heat insulation covers /h	-	214	214	214	214	214	214	214	214	214
Repairs/maintenance /s	-	99	99	99	99	99	99	99	99	99
Others /t	61	176	176	176	176	176	176	176	176	176
Subtotal	1,290	3,692	3,692	3,692	3,692	3,692	3,692	3,692	3,692	3,692
Opportunity Cost of Land /u	150	150	150	150	150	150	150	150	150	150
Debt Service										
Principal (6 year to repay, 1 year grace)	-	815	815	815	815	815	-	-	-	-
Interest (18.5% on beginning of year balance)	754	754	603	452	302	151	-	-	-	-
Subtotal	754	1,569	1,418	1,267	1,117	966	-	-	-	-
Total Incremental Outflow	6,725	5,411	5,260	5,109	4,959	5,423	3,842	5,187	3,842	3,482
Net Cash Flow	(1,802)	(1,238)	245	954	1,104	640	2,221	876	2,221	3,482
Net Incremental Benefit	(5,123)	331	1,663	2,221	2,221	1,606	2,221	876	2,221	2,581

Financial rate of return : 30%
Economic rate of return /v: 35%

/a Only cucumbers grown first year. Prices calculated as quantity-weighted averages of monthly prices October-December of W 350/kg (cucumbers) and February-June of W 1252/kg (green peppers), using Seoul wholesale prices adjusted upward 5% for quality, downward 7% for marketer's commission, and downward W 39/kg and W 55/kg for box and transportation costs of cucumbers and green peppers, respectively, to get farmgate prices.
/b Price W 303/kg; yield 2,800 kg first year, 3,750 kg second year, 4,675 kg from third year on.
/c Price W 1,168/kg; yield 2,600 kg second year, 3,500 kg third year, 4,350 kg from fourth year on.
/d Three-quarter style, 70 m x 7 m x 3.8 m, steel pipe; durable period 15 years.
/e Plastic pipe with small holes; pump durable period 10 years, pipe 5 years; residual value end of year 15 is W 300,000.
/f Hanil OH-225 oil stove using 2.6 l/hr; durable period 5 years.
/g Power sprayers durable period 10 years; residual value end of year 15 is W 60,000.
/h Synthetic fiber 0.2 ha; durable period 5 years; 20% replaced each year.
/i Includes film, plastic banding and wire, replaced yearly.
/j 2.6 dl at W 15,000/dl for cucumber, 2 dl at W 12,500/dl for green pepper.
/k 2 rolls of polyethylene at W 3,500 each for cucumber and green pepper.
/l 17.7 cu m at W 5,124 for cucumber and green pepper.
/m 21 cu m at W 6,297/cu m for green peppers.
/n Wire and wood for cucumbers, plastic bands for green peppers.
/o For cucumber, 3,000 kg compost at W 10/kg, 100 kg lime at W 18/kg, 71 kg N at W 319/kg, 50 kg P at W 190/kg and 43 kg K at W 84/kg. For green pepper, compost and lime same, but 53/kg N, 44/kg P and 39/kg K.
/p For cucumber, 1 kg Daconil at W 5,120/kg, 1 kg Disen M-45 at W 2,343/kg, 0.5 kg Topsin M at W 7,434/kg, 0.5 kg Metasystox at W 3,404/kg and 3 kg Hepta at W 384/kg. For green pepper, 1.5 kg Daconil, 1 kg Diporathan at W 4,583/kg, 1 kg Sevin at W 2,100/kg, 1 kg metasystox, and same as cucumbers with Topsin M, Dipterex and Hepta.
/q Heavy oil, W 153/l; cucumbers require 2,415 l, green peppers 4,503 l.
/r Male labor priced at W 7,500/8 hr, female at W 3,500/8 hr; cucumbers use 331 hrs male and 364 hrs female labor; green peppers use 525 hrs and 400 hrs, respectively.
/s 3% of initial investment cost of frame, irrigation facility, heating facility and sprayers.
/t Farm tools, farm warehouse, animal labor, and miscellaneous of 5% of other operating costs.
/u Rent of the land used for the greenhouse; W 500/pyeong x 300 pyeong (0.1 ha).
/v See Annex 6, Table 8 for a summary of prices used in the economic analysis.

KOREA

THIRD AGRICULTURAL CREDIT PROJECT

Improved 0.1 ha Greenhouse - Cash Flow and Benefit/Cost Analysis
(Won'000)

Year	1	2	3	4	5	6	7	8	9	10
Cash Inflow										
Sales /a										
With Iron Frame										
Cucumber	1,417	1,417	1,417	1,417	1,417	1,417	1,417	1,417	1,417	1,417
Green pepper	4,646	4,646	4,646	4,646	4,646	4,646	4,646	4,646	4,646	4,646
Subtotal	6,063	6,063	6,063	6,063	6,063	6,063	6,063	6,063	6,063	6,063
Without Iron Frame										
Cucumber	1,204	1,204	1,204	1,204	1,204	1,204	1,204	1,204	1,204	1,204
Green pepper	3,949	3,949	3,949	3,949	3,949	3,949	3,949	3,949	3,949	3,949
Subtotal	5,153	5,153	5,153	5,153	5,153	5,153	5,153	5,153	5,153	5,153
Incremental	910	910	910	910	910	910	910	910	910	910
Loan (70% of first-year investment costs)	2,361	-	-	-	-	-	-	-	-	-
Total Incremental Inflow	3,271	910	910	910	910	910	910	910	910	910
Cash Outflow										
Investment and Replacement Costs										
Iron frame /b	1,960	-	-	-	-	-	-	-	-	(653)
Irrigation facility /c	341	-	-	-	-	756	-	-	-	(240)
Heating facility /d	-	-	465	-	-	-	-	465	-	(186)
Heat insulation covers /e	1,072	-	-	-	-	-	-	-	-	-
Sprayer /f	-	-	124	-	-	-	-	-	-	(31)
Subtotal	3,373	-	589	-	-	756	-	465	-	(1,110)
Operating Costs										
With Iron Frame /g										
Fuel	1,074	1,074	1,074	1,074	1,074	1,074	1,074	1,074	1,074	1,074
Labor	1,280	1,280	1,280	1,280	1,280	1,280	1,280	1,280	1,280	1,280
Heat insulation covers	-	214	214	214	214	214	214	214	214	214
Repairs/maintenance	99	99	99	99	99	99	99	99	99	99
Others	965	1,025	1,025	1,025	1,025	1,025	1,025	1,025	1,025	1,025
Subtotal	3,418	3,692	3,692	3,692	3,692	3,692	3,692	3,692	3,692	3,692
Without Iron Frame										
Fuel /h	1,193	1,193	1,193	1,193	1,193	1,193	1,193	1,193	1,193	1,193
Labor /i	1,408	1,408	1,408	1,408	1,408	1,408	1,408	1,408	1,408	1,408
Frame materials /j	194	194	194	194	194	194	194	194	194	194
Heat insulation covers /k	200	200	200	200	200	200	200	200	200	200
Repairs/maintenance	40	40	40	40	40	40	40	40	40	40
Others /l	960	960	960	960	960	960	960	960	960	960
Subtotal	3,995	3,995	3,995	3,995	3,995	3,995	3,995	3,995	3,995	3,995
Incremental	(577)	(303)	(303)	(303)	(303)	(303)	(303)	(303)	(303)	(303)
Debt Service										
Principal (6 years to repay; 1 year grace)	-	472	472	472	472	473	-	-	-	-
Interest (18.5% on beginning of year balance)	437	437	356	262	175	88	-	-	-	-
Subtotal	437	909	828	734	647	561	-	-	-	-
Total Incremental Outflow	3,233	606	1,114	431	344	1,014	(303)	768	(303)	(1,413)
Net Cash Flow	38	304	(204)	479	566	(104)	1,213	142	1,213	2,323
Net Incremental Benefit	(1,886)	1,213	624	1,213	1,213	457	1,213	748	1,213	2,323

Financial rate of return : 53%
Economic rate of return /m: 48%

/a Prices and yields for the improved greenhouse are the same as those in the New Greenhouse model; with no improvements, the lower bamboo-framed greenhouse produces vegetables worth 15% less.
/b Frame residual value 33% at end of year 10.
/c Iron pipe and plastic feeders augment existing pump station; pump, feeders and pipes replaced year 6, and 50% residual value of pump credited in year 10.
/d Same as new greenhouse oil stove, but existing stove replaced in year 3; year 10 residual value of second replacement stove 40%.
/e Same as new greenhouse covers.
/f Same as new greenhouse sprayer, but existing sprayer replaced in year 3; year 10 residual value 25%.
/g Same as new greenhouse operating costs.
/h Fuel cost 10% higher than with project because synthetic fiber covers insulate more efficiently.
/i Labor costs 10% higher than with project because working conditions are more difficult.
/j One-third of frame materials initial cost (W 581,000) replaced yearly.
/k One-third of straw blanket insulation covers initial cost (W 600,000) replaced yearly.
/l Seed, seed pot, seed bed soil, heating material, supports, fertilizer, pesticide, polyethylene film, etc.
/m See Annex 6, Table 8 for a summary of prices used in the economic analysis.

KOREA

THIRD AGRICULTURAL CREDIT PROJECT

Sprinkler Irrigation on 1.0 Ha Vegetable Field -
Cash Flow and Benefit/Cost Analysis
(Won'000)

Year:	1	2	3	4	5	6	7-9	10
Cash Inflow								
Sales /a								
With Project								
Red pepper	1,069	1,283	1,283	1,283	1,283	1,283	1,283	1,283
Carrot	833	1,000	1,000	1,000	1,000	1,000	1,000	1,000
Cabbage	935	1,122	1,122	1,122	1,122	1,122	1,122	1,122
Chinese cabbage	2,297	2,756	2,756	2,756	2,756	2,756	2,756	2,756
Potato	701	841	841	841	841	841	841	841
Welsh onion	605	726	726	726	726	726	726	726
Subtotal	6,440	7,728	7,728	7,728	7,728	7,728	7,728	7,728
Without Project								
Red pepper	1,069	1,069	1,069	1,069	1,069	1,069	1,069	1,069
Carrot	833	833	833	833	833	719	719	719
Cabbage	935	925	925	925	925	821	821	821
Chinese cabbage	2,297	2,297	2,297	2,297	2,297	2,292	2,292	2,292
Potato	701	701	701	701	701	987	987	987
Welsh onion	605	605	605	605	605	657	657	657
Subtotal	6,440	6,440	6,440	6,440	6,440	6,440	6,440	6,440
Incremental	-	1,288	1,288	1,288	1,288	1,288	1,288	1,288
Loan (70% of first-year investment)	1,406	-	-	-	-	-	-	-
Total Incremental Inflow	1,406	1,288	1,288	1,288	1,288	1,288	1,288	1,288
Cash Outflow								
Investment and Replacement Costs /b								
Well development	470	-	-	-	-	-	-	(235)
Piping	428	-	-	-	-	375	-	-
Pumping station	655	-	-	-	-	-	-	-
Sprinkler set	151	-	-	-	-	-	-	-
Others	304	-	-	-	-	104	-	-
Subtotal	2,008	-	-	-	-	479	-	(235)
Operating Cost /c								
With Project								
Red pepper	334	388	388	388	388	388	388	388
Carrot	208	242	242	242	242	242	242	242
Cabbage	212	246	246	246	246	246	246	246
Chinese cabbage	207	245	245	245	245	245	245	245
Potato	353	376	376	376	376	376	376	376
Welsh onion	261	299	299	299	299	299	299	299
Subtotal	1,575	1,796	1,796	1,796	1,796			
Without Project								
Red pepper	334	334	334	334	334	334	334	334
Carrot	208	208	208	208	208	208	208	208
Cabbage	212	212	212	212	212	212	212	212
Chinese cabbage	207	207	207	207	207	207	207	207
Potato	353	353	353	353	353	353	353	353
Welsh onion	261	261	261	261	261	261	261	261
Subtotal	1,575	1,575	1,575	1,575	1,575	1,575	1,575	1,575
Sprinkler Operating Cost /d								
Labor	-	56	56	56	56	56	56	56
Fuel	-	138	138	138	138	138	138	138
Maintenance	-	106	106	106	106	106	106	106
Subtotal	-	300	300	300	300	300	300	300
Incremental	-	521	521	521	521	521	521	521
Debt Service								
Principal (5 years to repay; 1 year grace)	-	352	352	351	351	-	-	-
Interest (18.5% on beginning of year balance)	260	260	195	130	65	-	-	-
Subtotal	260	612	547	481	416	-	-	-
Total Incremental Outflow	2,268	1,133	1,068	1,002	937	1,000	521	286
Net Cash Flow	(862)	155	220	286	351	288	767	1,002
Net Incremental Benefit	(2,008)	767	767	767	767	288	767	1,002

Financial rate of return : 34%
Economic rate of return /e: 32%

Footnotes

/a Basic data on sales assume without-project yields remain at 1975-79 national average, no project yield increase in first year, 20% project yield increase thereafter, no change in prices per kilogram.

	Red pepper	Carrot	Cabbage	Chinese cabbage	Potato	Welsh onion
Price (W/kg)	2,764	206	112	83	204	116
Yield (kg/0.1 ha) (without project)	116	1,277	2,623	8,731	1,085	1,652

Each crop is sown on one-third of a hectare, with red pepper, carrot, and cabbage planted in spring, and the others in fall.

/b Well is steel-reinforced concrete 1 m in diameter, 6 m deep, useful life 20 years, with 50% of value remaining at end of year 10. Main pipe is 105 m of buried PVC line; movable lateral and riser pipes included; all but fittings replaced after 5 years. Pumping station includes 8 hp kerosene engine and 2" diameter pump with 41 m water pressure, useful life 10 years. Sprinkler set includes 40 heads. Other costs include various valves, supports, etc.

/c Basic data excluding sprinkler operating costs are given in won per year for each crop with the project; without-project costs are in parentheses below. Operating costs do not change in Year 1. Costs are for 0.1 ha per crop.

	Red pepper	Carrot	Cabbage	Chinese cabbage	Potato	Welsh onion
Seed	15,000	9,000	10,000	3,375	68,964	7,000
	(15,000)	(9,000)	(10,000)	(3,375)	(68,964)	(7,000)
Fertilizer:						
N	9,251	8,422	9,953	13,175	4,594	9,538
	(7,720)	(7,018)	(8,294)	(10,974)	(3,828)	(7,943)
P_2O_5	3,971	3,876	2,964	3,876	2,603	4,712
	(3,306)	(3,230)	(2,470)	(3,230)	(2,166)	(3,933)
K_2O	1,982	1,814	1,915	2,873	1,411	2,478
	(1,655)	(1,512)	(1,596)	(2,394)	(1,176)	(2,066)
Compost	21,360	22,500	18,000	19,020	15,860	21,460
	(17,800)	(18,750)	(15,000)	(15,850)	(13,200)	(17,880)
Biocides	13,728	5,160	5,400	5,256	2,784	14,141
	(11,440)	(4,300)	(4,500)	(4,380)	(2,320)	(11,784)
Other materials	11,278	-	-	360	-	-
	(9,398)	(-)	(-)	(300)	(-)	(-)
Farm tools	3,625	3,625	3,625	3,625	2,062	3,625
	(3,021)	(3,021)	(3,021)	(3,021)	(1,718)	(3,021)
Power tiller	3,200	2,100	2,100	2,140	2,000	1,800
	(3,200)	(2,100)	(2,100)	(2,140)	(2,000)	(1,800)
Labor: Male	17,531	8,531	11,344	11,344	7,313	13,071
	(14,625)	(7,125)	(9,469)	(9,469)	(6,094)	(11,813)
Female	15,680	7,630	8,470	8,470	5,390	12,040
	(13,090)	(6,370)	(7,070)	(7,070)	(4,480)	(10,920)
Total	116,606	72,658	73,771	73,514	112,981	89,825
	(100,255)	(62,426)	(63,520)	(62,203)	(105,966)	(78,160)

/d Labor cost assumes 15 irrigations per year x 13.2 hours per irrigation x 0.5 portion of irrigation time using labor x 0.6 portion of labor hired x W 937.5 per hour of paid male labor. Fuel cost is 15 irrigations x 13.2 hours per irrigation x 0.449 liters per hour x W 179 per liter (kerosene), plus 14.4 liters x W 580 per liter (gasoline). Maintenance, beginning in Year 2, is 10% per year of the costs of materials with a 5-year life (W 375,000 piping, W 104,000 others), 5% per year of the cost of materials with a 10-year life (W 53,000 piping, W 655,000 pumping station, W 151,000 sprinkler set, W 200,000 others), and 1% per year for the well, for a yearly total of W 105,550.

/e See Annex 6, Table 8 for a summary of prices used in the economic analysis.

ANNEX 6
Table 4

KOREA

THIRD AGRICULTURAL CREDIT PROJECT

Sprinkler Irrigation on 1.0 ha Apple Orchard - Cash Flow and Benefit/Cost Analysis
(Won'000)

Year	1	2	3	4	5	6	7	8	9	10	11	12-13	14	15	16	17	18	19	20
Cash Inflow																			
Sales																			
With project /a		114	1,315	3,089	6,576	8,768	10,521	11,398	13,152	13,152	13,152	13,152	12,275	11,398	10,083	8,768	8,329	7,453	7,014
Without project /b		86	990	2,310	4,949	6,599	7,919	8,579	9,898	9,898	9,898	9,898	9,238	8,579	7,589	6,599	6,269	5,609	5,279
Incremental		28	325	759	1,627	2,169	2,602	2,819	3,254	3,254	3,254	3,254	3,037	2,819	2,494	2,169	2,060	1,844	1,735
Loan (70% of first-year investment costs)	2,327	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total Investment Flow	2,327	28	325	759	1,627	2,169	2,602	2,819	3,254	3,254	3,254	3,254	3,037	2,819	2,494	2,169	2,060	1,844	1,735
Cash Outflow																			
Investment & Replacement Costs																			
Well development /c	735																		
Piping /d	870										14								
Pumping station /e	769										769								
Sprinkler set /f	408										408								
Other	542										316								
Subtotal	3,324										1,507								
Operating Cost /g																			
With Project																			
Saplings (500 @ W 1,000)	500																		
Fertilizer	124	225	24	308	49	378	196	241	277	277	296	296	296	296	284	236	216	204	196
Farm chemicals	25	37	74	98	172	246	345	394	482	482	517	517	517	517	517	517	517	517	517
Farm tools	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42
Other materials	148	25	49	258	316	679	1,105	1,267	1,586	1,586	1,612	1,673	1,612	1,612	1,559	1,267	982	893	588
Labor	683	1,223	473	1,965	691	2,474	1,148	1,301	1,436	1,436	1,460	1,460	1,460	1,460	1,286	1,202	1,191	1,090	1,034
Subtotal	1,521	1,551	662	2,671	1,271	3,820	2,836	3,245	3,821	3,821	3,927	3,989	3,927	3,927	3,689	3,264	2,948	2,746	2,378
Without Project																			
Saplings (500 @ W 1,000)	500																		
Fertilizer	107	195	21	268	42	329	170	210	241	241	257	257	257	257	247	205	188	177	171
Farm chemicals	22	32	64	224	150	206	300	342	419	419	451	451	451	451	451	451	451	451	451
Farm tools	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37
Other materials	129	21	43	224	275	591	961	1,101	1,379	1,379	1,401	1,455	1,401	1,401	1,356	1,101	854	777	511
Labor	593	1,065	412	1,710	605	2,146	996	1,131	1,250	1,250	1,271	1,271	1,271	1,271	1,116	1,043	1,032	950	899
Subtotal	1,407	1,350	577	2,463	1,109	3,308	2,465	2,821	3,325	3,325	3,417	3,471	3,471	3,471	3,206	2,837	2,561	2,391	2,068
Sprinkler Operating Cost																			
Labor /h	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35
Fuel /i	144	144	144	144	144	144	144	144	144	144	144	144	144	144	144	144	144	144	144
Maintenance /j	94	94	94	94	94	94	94	94	94	94	94	94	94	94	94	94	94	94	94
Subtotal	273	273	273	273	273	273	273	273	273	273	273	273	273	273	273	273	273	273	273
Incremental	387	474	358	481	435	785	644	697	769	769	783	791	729	729	756	700	660	628	583
Debt Service																			
Principal (9 years to repay, 4 years grace)	-	-	-	-	465	465	465	465	465	-	-	-	-	-	-	-	-	-	-
Interest (18.5% on beginning of year balance)	430	430	430	430	430	344	258	172	86	-	-	-	-	-	-	-	-	-	-
Subtotal	430	430	430	430	895	809	723	637	553	-	-	-	-	-	-	-	-	-	-
Total Incremental Outflow	4,141	904	788	911	1,330	1,594	1,367	1,334	1,320	769	2,290	791	729	729	756	700	660	628	583
Net Cash Flow	(1,814)	(876)	(463)	(152)	297	575	1,235	1,485	1,934	2,485	964	2,463	2,308	2,090	1,738	1,469	1,400	1,216	1,152
Net Incremental Benefit	(3,711)	(446)	(33)	278	1,192	1,384	1,958	2,122	2,485	2,485	964	2,463	2,308	2,090	1,738	1,469	1,400	1,216	1,152

Financial rate of return : 23%
Economic rate of return /k: 24%

/a Assumes yield increase of 17% over without-project case for new dwarf apple orchard, and average price of output (including by-products) of W 374.69/kg, representing quality premium of 13.5%.
/b Average price (including byproducts) is W 330.04.
/c Well is steel-reinforced concrete 1.5 m diameter, 6 m deep, service life 20 years.
/d 765 m PVC pipe, service life 20 years.
/e 8 hp kerosene engine, capacity 560 l/minute, 2 inches diameter; service life 10 years.
/f 56 heads in 4 parts, 14 heads operating simultaneously; service life 10 years.
/g Quantities of all nonsprinkler inputs except saplings and farm tools vary by year. Averages are as follows, in kg except where specified:

	N	P	K	Compost	Ca	Farm chemical (1)	Labor (days) Male	Female
With project	162	81	160	12,990	1,390	23,940	136	50
Without project	141	70	139	11,300	1,330	20,810	118	43

/h Labor computed as 8 irrigations/year x 26 hours/irrigation x 0.3 portion of irrigation time using labor x 0.6 portion of labor hired ÷ 8 hours/day x W 7,500/day = W 35,100/year.
/i Fuel computed as 18 l x W 580/l = W 10,400 (gasoline) plus 8 hp x 0.449 l/hp-hr x 26 hours/irrigation x 8 irrigations x W 179/l = W 133,737. Total: W 144,137.
/j Maintenance is 5%/yr of cost of investments with 10-year life (W 14,000 piping, W 769,000 pumping station, W 408,000 sprinkler set, W 316,000 other) plus 1%/yr of cost of investments with 20-year life (W 735,000 well, W 856,000 piping, W 226,000 other). Total: W 93,520/year.
/k See Annex 6, Table 8 for a summary of prices used in the economic analysis.

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THIRD AGRICULTURAL CREDIT PROJECT

On-Farm Apple Storage - Cash Flow and Benefit/Cost Analysis

Year	1	2	3	4	5	6	7	8	9	10	11	12	13	14-18	19	20
	(Tons)															
Typical Production, Full Size Trees																
Age 13 years (1.4 ha)	21.00	23.80	28.00	30.80	33.60	36.40	39.20	40.60	42.00	42.00	42.00	42.00	42.00	42.00	40.60	40.60
Age 8 years (0.4 ha)	1.20	2.00	3.20	4.40	5.20	6.00	6.80	8.00	8.80	9.60	10.40	11.20	11.60	12.00	12.00	12.00
Total	22.20	25.80	31.20	35.20	38.80	42.40	46.00	48.60	50.80	51.60	52.40	53.20	53.60	54.00	52.60	52.60
Storable 80% of production /a	17.76	20.64	24.96	28.16	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00
Quantity Sold																
With Storage																
At harvest	4.44	5.16	6.24	7.04	8.80	12.40	16.00	18.60	20.80	21.60	22.40	23.20	23.60	24.00	22.60	22.60
After 2 months	8.88	10.32	12.48	14.08	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00
After 4 months	5.06	5.88	7.11	8.03	8.55	8.55	8.55	8.55	8.55	8.55	8.55	8.55	8.55	8.55	8.55	8.55
Damaged	0.26	0.31	0.37	0.42	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45
After 6 months	3.20	3.71	4.49	5.07	5.40	5.40	5.40	5.40	5.40	5.40	5.40	5.40	5.40	5.40	5.40	5.40
Damaged	0.18	0.21	0.25	0.28	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30
Spoiled	0.20	0.21	0.26	0.28	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30
Without Storage	22.20	25.80	31.20	35.20	38.80	42.40	46.00	48.60	50.80	51.60	52.40	53.20	53.60	54.00	52.60	52.60
	(W'000)															
Cash Inflow																
Sales																
With Storage /b																
At harvest (W 354/kg)	1,572	1,827	2,209	2,492	3,115	4,390	5,664	6,584	7,363	7,646	7,930	8,213	8,354	8,496	8,000	8,000
After 2 months (W 470/kg)	4,174	4,850	5,866	6,618	7,050	7,050	7,050	7,050	7,050	7,050	7,050	7,050	7,050	7,050	7,050	7,050
After 4 months (W 552/kg)	2,793	3,246	3,925	4,433	4,720	4,720	4,720	4,720	4,720	4,720	4,720	4,720	4,720	4,720	4,720	4,720
Damaged (W 165/kg)	43	51	61	69	74	74	74	74	74	74	74	74	74	74	74	74
After 6 months (W 583/kg)	1,866	2,163	2,618	2,956	3,148	3,148	3,148	3,148	3,148	3,148	3,148	3,148	3,148	3,148	3,148	3,148
Damaged (W 175/kg)	32	37	44	49	53	53	53	53	53	53	53	53	53	53	53	53
Subtotal	10,479	12,174	14,722	16,616	18,160	19,435	20,709	21,629	22,408	22,691	22,975	23,258	23,399	23,541	15,845	15,845
Without Storage (W 354/kg)	7,859	9,133	11,045	12,461	13,735	15,010	16,284	17,204	17,983	18,266	18,550	18,833	18,974	19,116	18,620	18,620
Incremental	2,620	3,041	3,677	4,155	4,425	4,425	4,425	4,425	4,425	4,425	4,425	4,425	4,425	4,425	4,425	4,425
Loan (70% of first-year incremental costs)	3,863	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total Incremental Inflow	6,483	3,041	3,677	4,155	4,425	4,425	4,425	4,425	4,425	4,425	4,425	4,425	4,425	4,425	4,425	4,425
Cash Outflow																
Investment and Replacement Costs																
Storage building /c	4,640	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Storage boxes /d	879	230	316	282	357	212	212	212	212	212	212	212	212	212	212	212
Subtotal	5,180	-	-	96	357	212	212	212	212	212	212	212	212	212	212	212
Operating Costs																
Labor /e	299	347	420	474	505	505	505	505	505	505	505	505	505	505	505	505
Sterilization /f	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23
Box repair and maintenance /g	44	51	62	70	74	74	74	74	74	74	74	74	74	74	74	74
Building repair and maintenance /h	-	93	93	93	93	93	93	93	93	93	93	93	93	93	93	93
Subtotal	366	514	598	660	695	695	695	695	695	695	695	695	695	695	695	695
Debt Service																
Principal (5 years to repay, 1 year grace)	-	966	966	966	965	-	-	-	-	-	-	-	-	-	-	-
Interest (18.5% on beginning of year balance)	715	715	536	357	179	-	-	-	-	-	-	-	-	-	-	-
Subtotal	715	1,681	1,502	1,323	1,144	-	-	-	-	-	-	-	-	-	-	-
Total Incremental Outflow	6,570	2,425	2,416	2,265	2,196	907	907	907	907	907	907	907	907	907	907	907
Net Cash Flow	(117)	616	1,261	1,890	2,229	3,518	3,518	3,518	3,518	3,518	3,518	3,518	3,518	3,518	3,518	3,518
Net Incremental Benefit	(3,265)	2,297	2,763	3,213	3,373	3,518	3,518	3,518	3,518	3,518	3,518	3,518	3,518	3,518	3,518	3,518

Financial rate of return : 83%
Economic rate of return /i: 78%

/a Maximum storage capacity is 30 mt.
/b Price increases with storage 33% after 2 months, 56% after 4 months, 65% after 6 months; damaged apples sell at 30% of current regular price.
/c 20 pyeong (66 sq m); height 3.6 m, length 10 m, width 6.6 m. Engineering Division of NACF estimates cost for this size of cement block storeroom at W 232,000/pyeong with concrete floor. Cost/pyeong falls as floor area rises.
/d Cost/box is W 742; each box holds 15 kg. Average box life is 7 years. Schedule box purchases:

Year	1	2	3	4	5	6-20
New boxes (incremental)	1,184	192	288	213	213	-
Replacement boxes	-	118	138	167	268	286

/e For precooling, sorting, packing, in-out of storage, care of stored fruit, 3 man-days x W 7,500/day and 5 woman-days x W 5,600/day are required per 200 boxes.
/f W 12,800/ha x 1.8 ha = W 23,040.
/g 5% of the value of wooden boxes.
/h 2% of construction cost per year.
/i See Annex 6, Table 8 for a summary of prices used in the economic analysis.

ANNEX 6
Table 6

KOREA

THIRD AGRICULTURAL CREDIT PROJECT

Refrigerated Storage - Cash Flow and Benefit/Cost Analysis
(Won '000)

Year	1	2	3	4	5	6	7-9	10
Cash Inflow								
Income from Sales /a								
With Project								
Onions at 3 months (90 mt x W 210/kg)	16,538	16,538	16,538	16,538	16,538	16,538	16,538	16,538
Onions at 7 months (45 mt x W 398/kg)	13,433	13,433	13,433	13,433	13,433	13,433	13,433	13,433
Onions at 8 months (45 mt x W 406/kg)	12,789	12,789	12,789	12,789	12,789	12,789	12,789	12,789
Apples at 4 months (45 mt x W 590/kg)	25,488	25,488	25,488	25,488	25,488	25,488	25,488	25,488
Apples at 5 months (45 mt x W 645/kg)	27,574	27,574	27,574	27,574	27,574	27,574	27,574	27,574
Subtotal	95,822	95,822	95,822	95,822	95,822	95,822	95,822	95,822
Without Project								
Onions (180 mt x W 134/kg)	24,120	24,120	24,120	24,120	24,120	24,120	24,120	24,120
Apples (90 mt x W 354/kg)	31,860	31,860	31,860	31,860	31,860	31,860	31,860	31,860
Subtotal	55,980	55,980	55,980	55,980	55,980	55,980	55,980	55,980
Incremental	39,842	39,842	39,842	39,842	39,842	39,842	39,842	39,842
Loan /a	54,538	-	-	-	-	-	-	-
Total Incremental Inflow	94,380	39,842	39,842	39,842	39,842	39,842	39,842	39,842
Cash Outflow								
Investment and Replacement Costs								
Storage building /b	40,991	-	-	-	-	-	-	(20,495)
Storage equipment /c	28,017	-	-	-	-	-	-	-
Storage boxes /d	8,904	400	800	1,272	1,272	1,272	1,272	1,272
Subtotal	77,912	400	800	1,272	1,272	1,272	1,272	(19,223)
Operating Costs								
Technician /e	3,750	3,750	3,750	3,750	3,750	3,750	3,750	3,750
Technician aide /f	2,400	2,400	2,400	2,400	2,400	2,400	2,400	2,400
Storage, handling, sorting, packing /g	3,226	3,226	3,226	3,226	3,226	3,226	3,226	3,226
Electricity /h	3,400	3,400	3,400	3,400	3,400	3,400	3,400	3,400
Parts and repairs - machinery /i	1,401	1,401	1,401	1,401	1,401	1,401	1,401	1,401
Repairs - boxes /j	-	445	445	445	445	445	445	445
Building maintenance /k	820	820	820	820	820	820	820	820
Subtotal	14,997	15,442	15,442	15,442	15,442	15,442	15,442	15,442
Debt Service								
Principal (6 years to repay; 1 year grace)	-	10,908	10,908	10,908	10,908	10,906	-	-
Interest (18.5% on beginning of year balance)	10,090	10,090	8,072	6,054	4,036	2,018	-	-
Subtotal	10,090	20,998	18,980	16,962	14,944	12,924	-	-
Total Incremental Outflow	102,999	36,840	35,222	33,676	31,658	29,638	16,714	(3,781)
Net Cash Flow	(8,618)	3,002	4,620	6,166	8,184	10,204	23,128	43,623
Net Incremental Benefit	(53,067)	24,000	23,600	23,128	23,128	23,128	23,128	43,623

Financial rate of return : 43%
Economic rate of return /l: 34%

/a 70% of first-year investment and replacement costs.
/b 100 pyeong (330 sq m); 3 separate storage rooms; capacity 2.25 mt/pyeong. Residual value end of year 10 is 50% of construction cost.
/c Includes condensing unit, cooling pipes, insulation, unit cooler, cold water pipes, ducts, control box, contractor's profit and 10% tax. Service life is 10 years.
/d 12,000 boxes holding 15 kg each, costing W 742 each. By year 4, one-seventh of boxes need replacement each year.
/e W 312,500/month x 12 months.
/f W 200,000/month x 12 months.
/g Costs per box: Take goods in: W 51; take goods out: W 51; sort and pack: W 167; total: W 269.
/h Basic charge W 740/kWh. Additional charge W 26/kWh. Electricity consumption/month: 40 kW x 12 hours x 30.5 days = 14,640 kWh. Yearly cost: 4 months x 40 kWh x W 740/kWh = kW 118,400; 8 months x (14,640-40) kWh x W 26/kWh = W 3,281,920; total: W 3,400,320.
/i 5%/year.
/j 5%/year.
/k 2%/year.
/l See Annex 6, Table 8 for a summary of prices used in the economic analysis.

KOREA

THIRD AGRICULTURAL CREDIT PROJECT

Speed Sprayer on 8 Ha Apple Orchard - Cash Flow and Benefit/Cost Analysis
(Won'000)

Year	1	2	3	4	5	6	7	8
Cash Inflow								
Operating Cost /a								
Without Project								
Labor /b	2,782	3,134	3,451	3,752	4,049	4,154	4,260	4,366
Farm chemicals /c	2,075	2,975	3,596	4,219	4,980	5,325	5,671	6,017
Fuel /d	355	355	355	355	355	355	355	355
Parts and repairs /e	200	200	200	200	200	200	200	200
Subtotal	5,412	6,664	7,602	8,526	9,584	10,034	10,486	10,938
With Project								
Labor /f	600	600	600	600	600	600	600	600
Farm chemicals /g	1,660	2,379	2,877	3,375	3,984	4,260	4,537	4,986
Fuel /h	835	835	835	835	835	835	835	835
Parts and repairs /i	950	950	950	950	950	950	950	950
Subtotal	4,045	3,873	4,371	4,869	5,478	5,754	6,031	6,480
Cost Saving	1,367	2,791	3,231	3,657	4,106	4,280	4,455	4,458
Loan (70% of investment)	5,565	-	-	-	-	-	-	-
Total Incremental Inflow	6,932	2,791	3,231	3,657	4,106	4,280	4,455	4,458
Cash Outflow								
Investment and Replacement Costs								
With Project								
Speed sprayers /j	7,950	-	-	-	-	-	-	(795)
Without Project								
Power sprayers (4) /k	-	-	-	-	2,004	-	-	(1,002)
Farm chemical hose /l	-	512	-	-	512	-	-	171
Subtotal	-	512	-	-	2,516	-	-	(831)
Incremental	7,950	(512)	-	-	(2,516)	-	-	36
Debt Service								
Principal (6 years to repay; 1 year grace)	-	1,113	1,113	1,113	1,113	1,113	-	-
Interest (18.5% on beginning of year balance)	1,030	1,030	824	618	412	206	-	-
Subtotal	1,030	2,143	1,937	1,731	1,525	1,319	-	-
Total Incremental Outflow	8,980	1,631	1,937	1,731	(991)	1,319	-	36
Net Cash Flow	(2,048)	1,160	1,294	1,925	5,097	2,961	4,455	4,422
Net Incremental Benefit	(6,583)	3,303	3,231	3,657	6,622	4,280	4,455	4,422

Financial rate of return : 55%
Economic rate of return /m: 49%

/a Speed sprayers do not increase sales, but reduce costs.
/b Male labor for spraying is W 9,000/day; female labor is W 5,600/day. Using power sprayers, 212 days of male labor and 156 days of female labor are required in year 1, when trees are assumed to be 6 years old; labor requirement increases by about 6.6%/year through year 8.
/c Starting with 108,000 liters, volume rises by about 16.4%/year through year 8.
/d Four power sprayers, 5 hp each; diesel fuel: 1,784 l x w 175/l. Gasoline: 8 l x W 580/l. Lubricating oil: 32 l x W 1,200/l.
/e 10%/year of purchase price.
/f Speed sprayer driver, paid W 12,000/day for 15 sprayings of 3 days each. Occasional help W 4,000/spraying.
/g Starting with 86,500 liters, volume rises by about 17.0%/year through year 8.
/h Kerosene for 27 PSI (maximum pressure) speed sprayer: 27 PSI x 0.449 l/PSI-hr x 15 sprayings x 24 hrs/spraying x w 179/l = W 781,206. Gasoline for starting: 20 l x W 580/l. Lubricating oil: 20 l x W 1,200/l.
/i About 12%/year of purchase price.
/j Shoshin Speed Sprayer Model 38-B02D-KT, with standard accessories and tools. Unit price W 5,178,900; cost including insurance, freight, taxes, commissions, etc. W 7,950,000. Assume 10% residual value after 8 years.
/k One power sprayer costing W 501,000 operates on 2 ha. Typical without-project farmer has half-depreciated equipment to be replaced in year 5, leaving residual value of 50% after year 8.
/l Hoses costing W 128,000 each must be replaced every 3 years. Typical without-project farmer replaces existing hoses years 2, 5 and 8, with 67% residual value at end of year 8 (net year 8 cost is 512 - 67% x 512).
/m See Annex 6, Table 8 for a summary of prices used in the economic analysis.

ANNEX 6
Table 8

KOREA

THIRD AGRICULTURAL CREDIT PROJECT

Prices Used in Project Appraisal

Item	Unit	Financial price /a	Economic price /b
Outputs			
Apple	Won/kg	354	308
Cabbage	Won/kg	107	93
Carrot	Won/kg	196	171
Chinese cabbage	Won/kg	79	69
Cucumber	Won/kg	303	264
Green pepper	Won/kg	1,168	1,016
Onion	Won/kg	134	117
Potato	Won/kg	194	169
Red pepper	Won/kg	2,764	2,405
Inputs			
Farm Labor			
Male	Won/day	7,500	6,150
Female	Won/day	5,600	4,592
Fertilizer			
N	Won/kg	319	265
P205	Won/kg	190	289
K20	Won/kg	84	118
Ca	Won/kg	18	27
Compost	Won/kg	10	9
Power tiller service	Won/hr	2,000	1,740
Gasoline	Won/liter	580	171
Kerosene	Won/liter	179	140
Diesel	Won/liter	175	125
Heavy oil	Won/liter	153	120
Speed sprayer	Machine	7,950	5,950
Electricity			
Agricultural class C	Won/kWh	26.00	37.12

/a Based on average 1980 market prices.

/b Based on the Bank estimate of the standard conversion factor of 0.89, and 0.87 for consumption goods, 0.91 for capital goods, and 0.82 for farm labor, except in the cases of fertilizers, speed sprayer, and fuels, where the world price, adjusted for transport, insurance, storage and handling, was used, and electricity, where production costs were used.

ANNEX 6
Table 9

KOREA

THIRD AGRICULTURAL CREDIT PROJECT

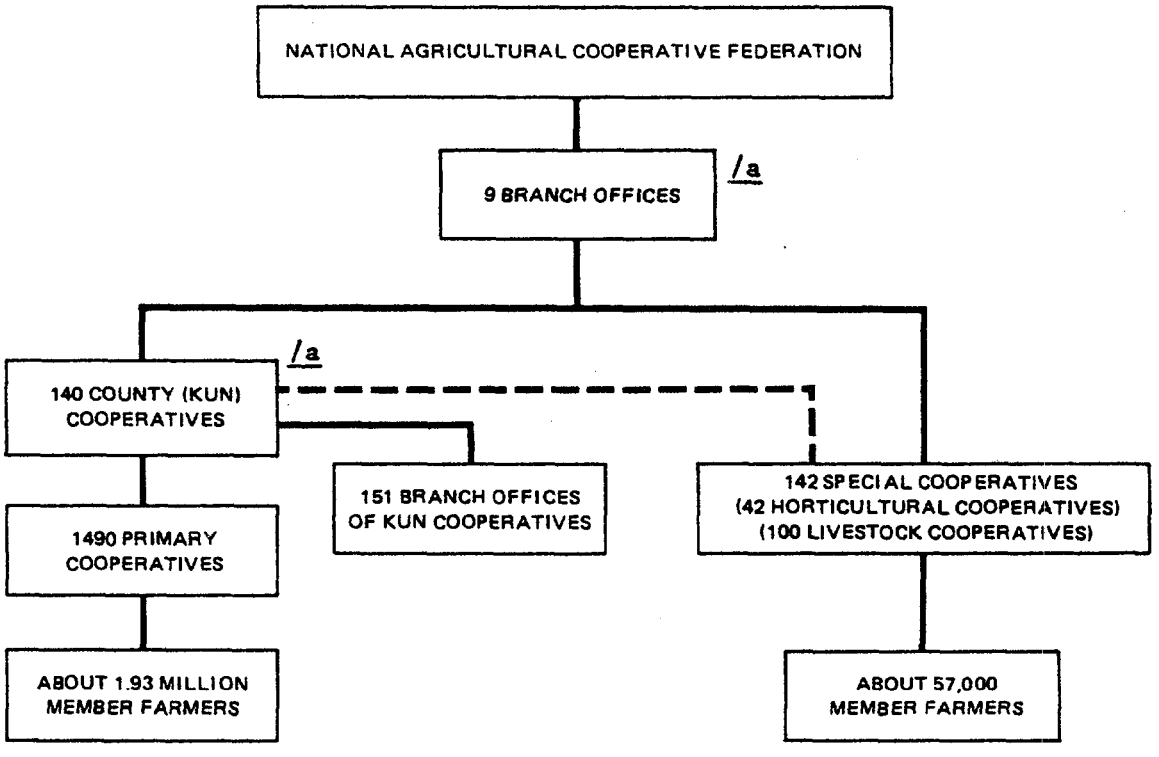
Aggregate Net Incremental Benefits /a
(W'000)

Year	New greenhouse	Improved greenhouse	Sprinkler irrigation-vegetables	Sprinkler irrigation-apples	On-farm storage	Refrigerated storage	Speed sprayer	Total
	Financial Net Incremental Benefits (FRR = 42%)							
1	-2,003,093	-435,666	-714,848	-1,525,221	-1,384,360	-902,139	-322,567	-7,287,894
2	-3,190,283	-410,073	-959,860	-2,654,832	-1,295,247	-1,130,943	-377,959	-10,019,197
3	-3,310,524	-285,116	-814,218	-3,435,261	-75,888	-919,346	-268,633	-9,108,986
4	-2,476,868	87,600	-413,802	-3,771,592	2,054,199	-133,104	-15,456	-4,669,023
5	3,966,160	1,645,046	2,008,773	228,034	8,341,493	2,920,688	1,373,107	20,483,301
6	5,400,577	1,436,248	1,838,249	1,565,752	9,366,997	2,886,752	1,537,779	24,032,354
7	5,753,650	1,641,057	1,714,667	2,991,466	10,052,182	2,867,872	1,720,998	26,741,892
8	5,650,945	1,460,310	1,637,069	4,461,978	10,336,717	2,867,872	1,850,174	28,265,065
9	5,588,830	1,353,687	1,590,606	5,384,183	10,480,122	2,867,872	1,351,274	28,626,574
10	6,152,170	1,958,868	2,092,433	6,303,589	10,480,122	3,216,287	1,016,697	31,220,166
11	5,626,275	1,801,545	1,880,011	6,138,264	10,480,122	3,069,051	543,906	29,539,174
12	5,280,610	1,707,522	1,447,143	6,082,587	10,480,122	2,582,794	0	27,580,778
13	5,055,995	1,210,283	874,746	5,800,239	10,480,122	1,744,920	0	25,166,305
14	4,920,150	0	0	5,568,952	10,480,122	0	0	20,969,224
15	6,292,930	0	0	6,785,184	10,480,122	0	0	23,558,236
16	5,517,039	0	0	6,364,814	10,480,122	0	0	22,361,975
17	4,137,951	0	0	5,690,567	10,480,122	0	0	20,308,640
18	2,364,196	0	0	4,981,750	10,480,122	0	0	17,826,068
19	0	0	0	4,302,794	10,480,122	0	0	14,782,916
20	0	0	0	3,842,988	10,480,122	0	0	14,323,110
21	0	0	0	3,107,104	10,480,122	0	0	13,587,226
22	0	0	0	2,113,024	10,480,122	0	0	12,593,146
23	0	0	0	1,082,880	10,480,122	0	0	11,563,002
	Economic Net Incremental Benefits (ERR = 41%)							
1	-1,744,642	-410,487	-650,412	-1,274,100	-1,292,352	-873,970	-232,407	-6,478,370
2	-2,690,402	-409,680	-883,258	-2,218,725	-1,268,664	-1,172,497	-290,534	-8,933,760
3	-2,649,706	-324,493	-767,852	-2,865,704	-241,036	-1,098,234	-244,512	-8,191,537
4	-1,741,048	-17,473	-425,151	-3,131,803	1,593,468	-507,218	-102,740	-4,331,965
5	4,075,666	1,399,234	1,754,730	241,499	7,275,512	2,272,040	877,415	17,896,096
6	5,313,524	1,209,218	1,599,514	1,409,632	8,171,862	2,241,140	1,017,233	20,962,123
7	5,614,780	1,395,594	1,487,026	2,650,331	8,775,444	2,223,940	1,175,806	23,322,921
8	5,521,260	1,231,145	1,416,394	3,912,868	9,026,898	2,223,940	1,287,192	24,619,697
9	5,464,700	1,134,136	1,374,102	4,705,651	9,157,446	2,223,940	893,953	24,953,928
10	5,977,660	1,684,863	1,830,914	5,491,127	9,157,446	2,541,007	669,919	27,352,936
11	5,499,076	1,555,977	1,647,606	5,374,243	9,157,446	2,459,924	357,315	26,051,587
12	5,184,508	1,492,958	1,270,894	5,372,121	9,157,446	2,107,668	0	24,585,595
13	4,980,100	1,069,092	771,732	5,144,833	9,157,446	1,463,440	0	22,586,643
14	4,856,476	0	0	4,934,942	9,157,446	0	0	18,948,864
15	6,105,908	0	0	5,891,349	9,157,446	0	0	21,154,703
16	5,346,426	0	0	5,499,477	9,157,446	0	0	20,003,349
17	4,002,818	0	0	4,893,756	9,157,446	0	0	18,054,020
18	2,277,176	0	0	4,318,160	9,157,446	0	0	15,752,782
19	0	0	0	3,772,775	9,157,446	0	0	12,930,221
20	0	0	0	3,375,499	9,157,446	0	0	12,532,945
21	0	0	0	2,732,288	7,854,070	0	0	10,586,358
22	0	0	0	1,859,490	5,717,640	0	0	7,577,130
23	0	0	0	954,100	3,040,186	0	0	3,994,286

/a Subproject phasing based on following assumptions on new subproject per project year:

	Year 1	Year 2	Year 3	Year 4	Total
New greenhouse	391	648	815	916	2,270
Improved greenhouse	231	366	463	521	2,081
Sprinkler irrigation - vegetables	356	614	776	873	2,619
Sprinkler irrigation - apples	411	666	842	940	2,859
On-farm apple storage	424	695	871	989	2,979
Refrigerated storage	17	29	38	40	124
Speed sprayer	49	82	106	123	360

KOREA
THIRD AGRICULTURAL CREDIT PROJECT
ORGANIZATION STRUCTURE OF
THE AGRICULTURAL COOPERATIVES IN KOREA



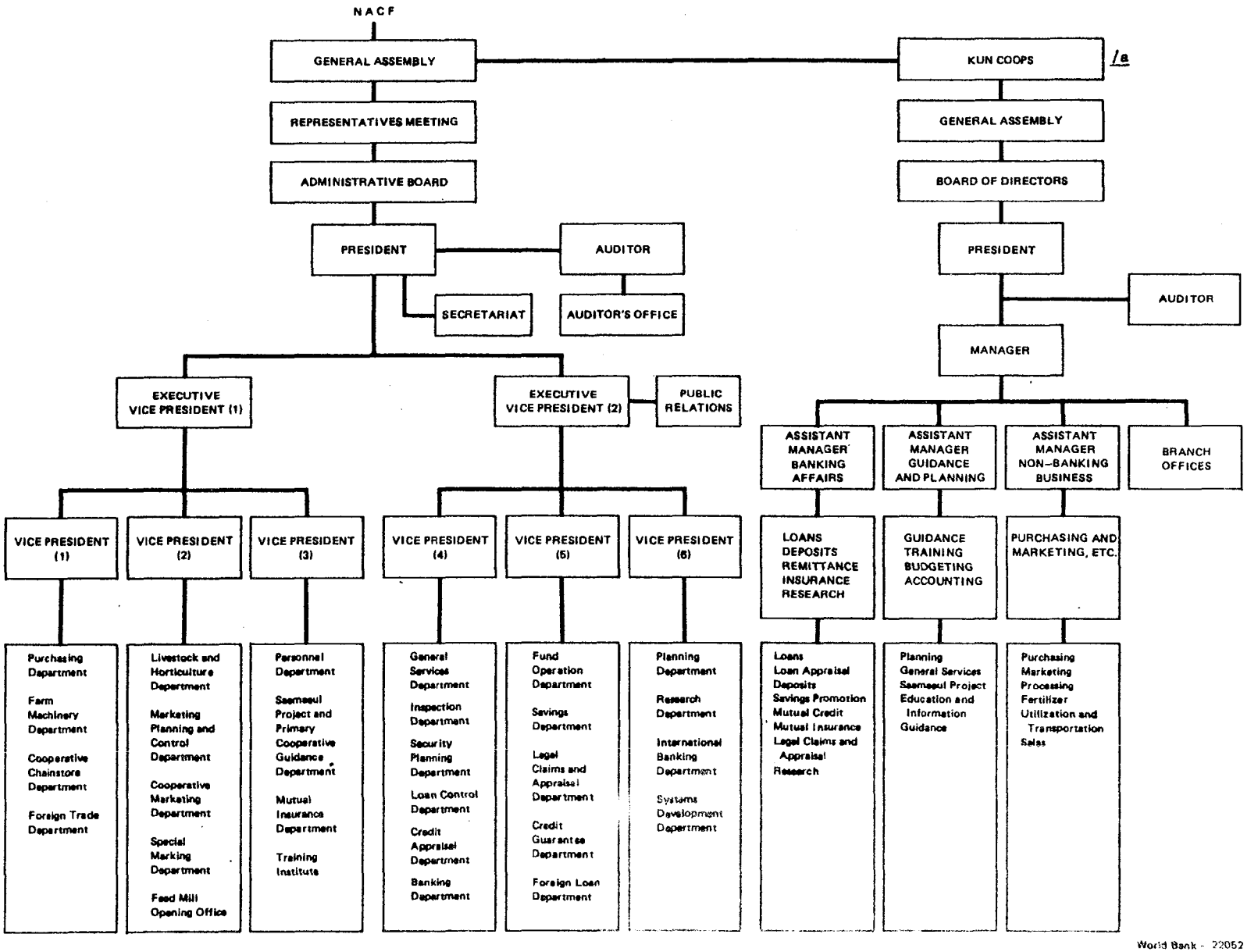
September 15, 1980

World Bank – 22051

/a Kun Cooperatives became branches of NACF with effect from January 1981; while about 11 former Kun Cooperative branches became Primary Cooperatives.

KOREA
THIRD AGRICULTURAL CREDIT PROJECT
ORGANIZATION OF NACF AND KUN COOPERATIVES

CHART 2



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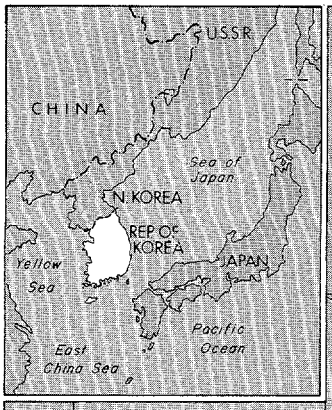
/a Branches of NACF with effect from January 1981.

IBRD 12351R1
JANUARY 1980



NORTH KOREA
East Sea
Yellow Sea
GYEONG GI
GANG WEON
CHUNG CHUNG NAM
CHUNG BUG
GYEONG BUG
JEON NAM
JEON BUG
GYEONG NAM
JEJU
SEOUL
BUSAN
Gimhwa
Sogcho
Panmunjum
Chuncheon
Gangneung
Euijeongbu
Mugho
Bugpyeong
Samcheog
Incheon
Anyang
Yeoju
Weonju
Jeongseon
Suweon
Anseong
Chungju
Cheonan
Manripo
Eunseong
Cheongju
Andong
Daejeon
Pohang
Yeonmu
Gimcheon
Janghang
Gunsan
Iri
Oggu
Jeonju
Gyeongju
Daegu
Ulsan
Onsan
Beabseongpo
Jinju
Masan
Jinhae
Gwangju
Suncheon
Samcheonpo
Chungmu
Jangseungpo
Mogpo
Yeosu
Mijo
Nogdong
Singeum
Wando
Jeju
Seogwipo
Han R.
Geum R.
Yeongsan R.
Nagdong R.

KOREA

Primary roads
Railways
Railways under construction
Airports
Ports
Rivers
Special cities
Provincial boundaries
International boundaries

0 20 40 60 80 100 120 140 160
KILOMETERS
0 20 40 60 80 100
MILES

125° 126° 127° 128° 129°
38° 37° 36° 35° 34°